



COMUNE DI SIENA

**STUDIO IDROLOGICO IDRAULICO DEI TORRENTI TRESSA,
RILUOGO, BOZZONE, SORRA E SERPENNA NEL TERRITORIO
COMUNALE DI SIENA**

***ET. 02.1 VERIFICHE IDRAULICHE E ALLEGATI
DI CALCOLO: T. TRESSA***

Agosto 2008 Rev.0

Progettista

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Risultati delle verifiche idrauliche

Torrente Tressa – tratto Tre.01

Il tratto oggetto di verifiche si estende per circa 4500 metri dallo svincolo Colonna S. Marco – Via Massetana Romana – zona Cerchiaia fino alla nuova rotatoria della variante SR 2 Cassia (svincolo su SGC Siena – Grosseto).

Lungo il tracciato sono presenti n. 4 attraversamenti della tangenziale ovest di Siena e n. 3 attraversamenti stradali; per un tratto di circa 180 metri, in prossimità della zona commerciale di Massetana Romana (sezioni 548-542), l'alveo presenta una sezione rettangolare rivestita in calcestruzzo, dei quali circa 80 metri risultano a sezione chiusa..



Foto 1 - tratto sottostante alla tangenziale ovest di Siena (sezione 590)

E' inoltre presente una traversa di epoca medioevale, legata al sistema dei mulini posti a valle (con funzione di presa per derivazione del canale di carico), collocata all'uscita del tratto che corre al di sotto della tangenziale (sezione 570).



foto 2- traversa (sezione 570)



Foto 3 - imbocco del tratto rivestito in calcestruzzo (sezione 550)



Foto 4 - tratto rivestito in calcestruzzo



Foto 5 – retro di edifici a confine con T. Tressa (sezione 525)

Nel tratto studiato si verificano ovunque condizioni di corrente lenta ($Fr < 1$), con velocità medie comprese tra 1,3 m/s e 4,2 m/s.

Si segnalano le seguenti criticità per i manufatti (attraversamenti stradali) presenti sul corso d'acqua:

- funzionamento idraulico in pressione del ponticello collocato sulla Strada di S. Apollinare per evento con $Tr \geq 200$ anni, e allagamento della strada stessa in destra idraulica (sezione 465).
- sormonto del ponticello che conduce all'impianto di distribuzione del gas metano per evento con $Tr \geq 30$ anni (sezione 405).



Foto 6 – ponte stradale Strada S. Apollinare (sezione 465)

Per quanto riguarda le zone a rischio di allagamento si segnalano:

- area in sinistra idraulica in località Molino San Cristoforo – zona delle Cerchiaia (a valle e in corrispondenza della sezione 360) per evento con $Tr \geq 200$ anni.



Foto 7 – T. Tressa a valle del Molino S. Cristoforo (sezione 360)

Torrente Tressa – tratto Tre.02

Il tratto oggetto di verifiche si estende per circa 1500 metri in corrispondenza della confluenza con il T. Arbia, a valle dell'abitato di Isola d'Arbia (zona ex Idit) fino all'area del depuratore comunale di Siena.

Lungo il tracciato sono presenti n. 2 attraversamenti di cui n. 1 per la ferrovia Siena-Buonconvento (sezione TR745) e n. 1 per la SS n.2 Cassia (sezione TR645).



Foto 8 – attraversamento ferroviario Siena-Buonconvento (sezione TR745)



Foto 9 – attraversamento stradale SS Cassia n.2 (sezione TR645)



Foto 10 – Strada di accesso al depuratore di Siena (sezione AR21679.9)

Nel tratto studiato si verificano ovunque condizioni di corrente lenta ($Fr < 1$), con velocità medie comprese tra 1,2 m/s e 4,2 m/s.

I risultati delle verifiche idrauliche, riportati nella planimetria delle aree allagate, sintetizzano i valori dei livelli idraulici massimi relativi a due condizioni:

- portata massima per il T. Tressa;
- rigurgito indotto dalla piena del T. Arbia

Quest'ultima condizione produce i valori massimi a partire dalla confluenza fino alla sezione 500, a monte della quale prevalgono i livelli idraulici legati alle portate del T. Tressa.

Si segnalano le seguenti criticità per i manufatti (attraversamenti stradali/ferroviari) presenti sul corso d'acqua:

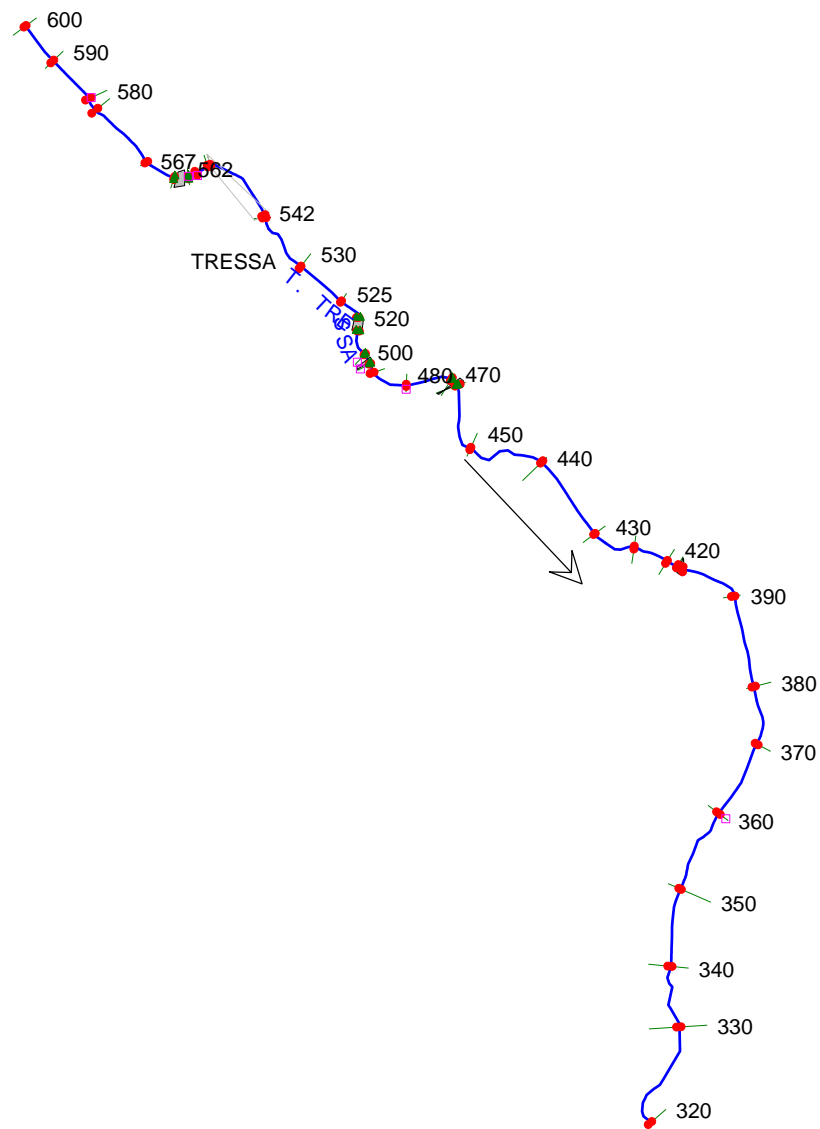
- funzionamento idraulico con franco di sicurezza inferiore ad 1 metro dell'attraversamento ferroviario per evento con $Tr \geq 200$ anni (sezione TR745).

Per quanto riguarda le zone a rischio di allagamento si rimanda all'elaborato grafico EG04.

Per la valutazione dei livelli di rischio idraulico relativa all'area del depuratore di Siena, compresa la strada di accesso, dovuta all'evento di piena per eventi con $Tr \geq 30$ anni per il T. Arbia, si rimanda allo studio idraulico Lombardi 2008 commissionato dall'acquedotto del Fiora e che ha avuto per oggetto la valutazione del rischio idraulico dell'area del depuratore di Siena, nonché della relativa strada di accesso.

ALLEGATI DI CALCOLO HEC-RAS 3.1.3

TRATTO TRE01 – TORRENTE TRESSA



HEC-RAS Plan: Tre01-b River: T. TRESSA Reach: TRESSA

Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Vel Total (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
TRESSA	600	Tr20	42.00	0.31	37.00	4.69	227.59	229.44	228.87	229.57	0.005702	1.66	1.30	32.24	40.22	0.43	0.46
TRESSA	600	Tr30	47.00	0.48	39.95	6.56	227.59	229.55	228.96	229.68	0.005296	1.67	1.28	36.79	43.05	0.41	0.44
TRESSA	600	Tr200	83.00	4.66	58.01	20.32	227.59	230.23	229.48	230.34	0.003544	1.72	1.06	78.67	87.34	0.36	0.35
TRESSA	590	Tr20	42.00		42.00		226.68	228.65	227.86	228.78	0.008923	1.59	1.59	26.35	16.30	0.40	0.40
TRESSA	590	Tr30	47.00		47.00		226.68	228.78	227.93	228.92	0.009129	1.66	1.66	28.37	16.52	0.40	0.40
TRESSA	590	Tr200	83.00		82.98	0.02	226.68	229.53	228.40	229.73	0.010594	2.01	2.01	41.33	18.70	0.42	0.43
TRESSA	580	Tr20	42.00		42.00		224.90	226.39	226.39	226.84	0.037681	2.98	2.98	14.10	15.62	1.00	1.00
TRESSA	580	Tr30	47.00		47.00		224.90	226.47	226.47	226.94	0.036750	3.04	3.04	15.47	16.33	1.00	1.00
TRESSA	580	Tr200	83.00		83.00		224.90	226.95	226.95	227.55	0.034674	3.44	3.44	24.15	20.24	1.00	1.00
TRESSA	570	Tr20	42.00		42.00		221.81	223.60	222.80	223.69	0.004217	1.30	1.30	32.33	24.02	0.36	0.36
TRESSA	570	Tr30	47.00		47.00		221.81	223.73	222.86	223.82	0.004036	1.32	1.32	35.55	24.88	0.35	0.35
TRESSA	570	Tr200	83.00		83.00		221.81	224.54	223.28	224.65	0.003233	1.44	1.44	57.82	30.14	0.33	0.33
TRESSA	567	Tr20	42.00		42.00		220.00	222.74	221.60	222.86	0.004548	1.53	1.53	27.43	15.45	0.37	0.37
TRESSA	567	Tr30	47.00		47.00		220.00	222.90	221.71	223.03	0.004487	1.57	1.57	29.91	16.02	0.37	0.37
TRESSA	567	Tr200	83.00	0.32	82.51	0.17	220.00	223.82	222.34	223.99	0.003708	1.82	1.77	46.77	21.73	0.35	0.39
TRESSA	565	Tr20	42.00		42.00		220.00	222.30	221.33	222.44	0.005543	1.69	1.69	24.78	13.13	0.39	0.39
TRESSA	565	Tr30	47.00		47.00		220.00	222.46	221.42	222.61	0.005477	1.75	1.75	26.88	13.36	0.39	0.39
TRESSA	565	Tr200	83.00		83.00		220.00	223.40	221.99	223.62	0.005424	2.07	2.07	40.10	14.73	0.40	0.40
TRESSA	563 BR U	Tr20	42.00		42.00		220.00	222.26	221.33	222.41	0.005842	1.73	1.73	24.33	13.08	0.40	0.40
TRESSA	563 BR U	Tr30	47.00		47.00		220.00	222.41	221.42	222.58	0.005748	1.78	1.78	26.43	13.31	0.40	0.40
TRESSA	563 BR U	Tr200	83.00		83.00		220.00	223.36	221.98	223.58	0.005613	2.10	2.10	39.61	14.68	0.41	0.41
TRESSA	563 BR D	Tr20	42.00		42.00		219.49	222.06	221.19	222.26	0.007405	1.96	1.96	21.41	11.45	0.46	0.46
TRESSA	563 BR D	Tr30	47.00		47.00		219.49	222.22	221.29	222.43	0.007377	2.02	2.02	23.22	11.72	0.46	0.46
TRESSA	563 BR D	Tr200	83.00		83.00		219.49	223.12	221.93	223.42	0.007674	2.44	2.44	33.98	12.18	0.47	0.47
TRESSA	562	Tr20	45.00		45.00		219.49	221.95	221.25	222.21	0.010032	2.23	2.23	20.20	11.27	0.53	0.53
TRESSA	562	Tr30	51.00		51.00		219.49	222.11	221.37	222.39	0.010118	2.32	2.32	21.99	11.54	0.54	0.54
TRESSA	562	Tr200	89.00		89.00		219.49	223.01	222.02	223.39	0.009852	2.72	2.72	32.69	12.13	0.53	0.53
TRESSA	560	Tr20	45.00		45.00		219.14	221.71	221.17	221.96	0.011919	2.20	2.20	20.41	14.28	0.59	0.59
TRESSA	560	Tr30	51.00		51.00		219.14	221.88	221.28	222.14	0.011203	2.22	2.22	22.94	15.12	0.58	0.58
TRESSA	560	Tr200	89.00		89.00		219.14	222.88	221.89	223.13	0.007500	2.20	2.20	40.39	19.92	0.49	0.49
TRESSA	550	Tr20	45.00		45.00		219.21	221.04	220.62	221.44	0.019895	2.81	2.81	16.00	9.00	0.67	0.67
TRESSA	550	Tr30	51.00		51.00		219.21	221.20	220.74	221.64	0.019769	2.92	2.92	17.46	9.04	0.67	0.67
TRESSA	550	Tr200	89.00		89.00		219.21	222.13	221.42	222.73	0.019319	3.43	3.43	25.96	9.28	0.65	0.65
TRESSA	548	Tr20	45.00		45.00		219.11	220.88	220.53	221.34	0.002613	2.99	2.99	15.04	9.00	0.72	0.72
TRESSA	548	Tr30	51.00		51.00		219.11	221.03	220.65	221.53	0.002567	3.13	3.13	16.30	9.04	0.72	0.72
TRESSA	548	Tr200	89.00		89.00		219.11	221.85	221.35	222.59	0.002380	3.82	3.82	23.29	9.24	0.74	0.74
TRESSA	545 BR U	Tr20	45.00		45.00		219.11	220.52	220.52	221.24	0.005514	3.74	3.74	12.02	8.50	1.00	1.00
TRESSA	545 BR U	Tr30	51.00		51.00		219.11	220.66	220.66	221.42	0.005278	3.88	3.88	13.13	8.50	1.00	1.00
TRESSA	545 BR U	Tr200	89.00		89.00		219.11	221.35	221.35	222.46	0.004664	4.68	4.68	19.03	8.50	1.00	1.00

HEC-RAS Plan: Tre01-b River: T. TRESSA Reach: TRESSA (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Vel Total (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
TRESSA	545 BR D	Tr20	45.00		45.00		217.00	219.05	218.42	219.39	0.001588	2.58	2.58	17.47	8.50	0.57	0.57
TRESSA	545 BR D	Tr30	51.00		51.00		217.00	219.21	218.54	219.59	0.001589	2.71	2.71	18.83	8.50	0.58	0.58
TRESSA	545 BR D	Tr200	89.00		89.00		217.00	219.94	219.24	220.59	0.001878	3.56	3.56	25.01	8.50	0.66	0.66
TRESSA	542	Tr20	46.00		46.00		217.00	219.03	218.44	219.39	0.001739	2.67	2.67	17.22	13.26	0.60	0.60
TRESSA	542	Tr30	52.00		52.00		217.00	219.19	218.56	219.58	0.001726	2.80	2.80	18.58	13.58	0.60	0.60
TRESSA	542	Tr200	91.00		91.00		217.00	219.90	219.27	220.60	0.002052	3.69	3.69	24.68	15.04	0.69	0.69
TRESSA	540	Tr20	46.00		46.00		216.86	219.11	218.11	219.26	0.005843	1.76	1.76	26.15	13.63	0.41	0.41
TRESSA	540	Tr30	52.00		52.00		216.86	219.28	218.22	219.45	0.005828	1.82	1.82	28.53	13.98	0.41	0.41
TRESSA	540	Tr200	91.00		91.00		216.86	220.10	218.81	220.35	0.006591	2.24	2.24	40.62	15.64	0.44	0.44
TRESSA	530	Tr20	46.00		46.00		215.15	218.11	217.15	218.27	0.006599	1.74	1.74	26.38	15.84	0.43	0.43
TRESSA	530	Tr30	52.00		52.00		215.15	218.29	217.26	218.45	0.006503	1.77	1.77	29.39	17.20	0.43	0.43
TRESSA	530	Tr200	91.00		91.00	0.00	215.15	219.11	217.89	219.36	0.005443	2.02	2.02	45.13	18.47	0.41	0.41
TRESSA	525	Tr20	46.00	0.10	45.90	0.00	213.93	216.90	216.12	217.19	0.009612	2.39	2.36	19.46	9.97	0.52	0.54
TRESSA	525	Tr30	52.00	0.19	51.81	0.00	213.93	217.04	216.26	217.37	0.009848	2.52	2.49	20.90	10.22	0.54	0.56
TRESSA	525	Tr200	91.00	1.56	89.44	0.00	213.93	217.77	216.98	218.32	0.011572	3.29	3.16	28.80	11.49	0.61	0.64
TRESSA	520	Tr20	46.00	3.36	42.64		213.99	216.60	215.42	216.70	0.002790	1.47	1.32	34.75	33.07	0.31	0.32
TRESSA	520	Tr30	52.00	4.41	47.59		213.99	216.74	215.52	216.86	0.002829	1.54	1.38	37.58	33.41	0.32	0.32
TRESSA	520	Tr200	91.00	11.95	79.05		213.99	217.48	216.14	217.66	0.003213	1.96	1.75	52.04	35.12	0.35	0.34
TRESSA	515 BR U	Tr20	46.00	3.26	42.74		213.99	216.58	215.42	216.68	0.002902	1.49	1.34	34.28	19.57	0.32	0.32
TRESSA	515 BR U	Tr30	52.00	4.31	47.69		213.99	216.72	215.52	216.84	0.002938	1.56	1.40	37.11	19.57	0.32	0.32
TRESSA	515 BR U	Tr200	91.00	11.82	79.18		213.99	217.45	216.15	217.64	0.003322	1.98	1.77	51.49	19.57	0.35	0.35
TRESSA	515 BR D	Tr20	46.00	0.08	45.63	0.29	213.89	216.33	215.63	216.54	0.008188	2.00	1.94	23.73	17.40	0.57	0.57
TRESSA	515 BR D	Tr30	52.00	0.17	51.18	0.65	213.89	216.47	215.74	216.69	0.007992	2.08	1.99	26.15	17.76	0.56	0.56
TRESSA	515 BR D	Tr200	91.00	1.54	85.63	3.82	213.89	217.15	216.35	217.47	0.007971	2.55	2.34	38.85	19.40	0.53	0.53
TRESSA	510	Tr20	46.00	0.08	45.64	0.28	213.89	216.33	215.63	216.53	0.008261	2.01	1.95	23.65	18.16	0.49	0.53
TRESSA	510	Tr30	52.00	0.17	51.19	0.64	213.89	216.47	215.74	216.69	0.008057	2.09	1.99	26.07	20.05	0.49	0.53
TRESSA	510	Tr200	91.00	1.53	85.66	3.81	213.89	217.15	216.35	217.47	0.008021	2.56	2.35	38.76	24.66	0.51	0.53
TRESSA	500	Tr20	46.00		46.00		212.05	216.09	213.54	216.16	0.000900	1.23	1.23	37.50	57.89	0.20	0.20
TRESSA	500	Tr30	52.00		52.00		212.05	216.23	213.65	216.32	0.001021	1.34	1.34	38.86	69.24	0.21	0.21
TRESSA	500	Tr200	91.00		91.00		212.05	216.87	214.29	217.08	0.001900	2.02	2.02	45.12	73.40	0.30	0.30
TRESSA	495 BR U	Tr20	46.00		46.00		212.05	216.07	213.54	216.15	0.000911	1.23	1.23	37.37	9.70	0.20	0.20
TRESSA	495 BR U	Tr30	52.00		52.00		212.05	216.21	213.65	216.30	0.001034	1.34	1.34	38.71	9.70	0.21	0.21
TRESSA	495 BR U	Tr200	91.00		91.00		212.05	216.84	214.30	217.05	0.001943	2.03	2.03	44.82	9.70	0.30	0.30
TRESSA	495 BR D	Tr20	46.00		46.00		212.05	216.06	213.54	216.14	0.000917	1.23	1.23	37.28	9.70	0.20	0.20
TRESSA	495 BR D	Tr30	52.00		52.00		212.05	216.20	213.65	216.29	0.001043	1.35	1.35	38.62	9.70	0.22	0.22
TRESSA	495 BR D	Tr200	91.00		91.00		212.05	216.82	214.30	217.03	0.001971	2.04	2.04	44.63	9.70	0.30	0.30
TRESSA	492	Tr20	46.00		46.00		212.05	216.06	213.54	216.14	0.000921	1.24	1.24	37.24	57.07	0.20	0.20
TRESSA	492	Tr30	52.00		52.00		212.05	216.19	213.65	216.29	0.001047	1.35	1.35	38.57	61.28	0.22	0.22

HEC-RAS Plan: Tre01-b River: T. TRESSA Reach: TRESSA (Continued)

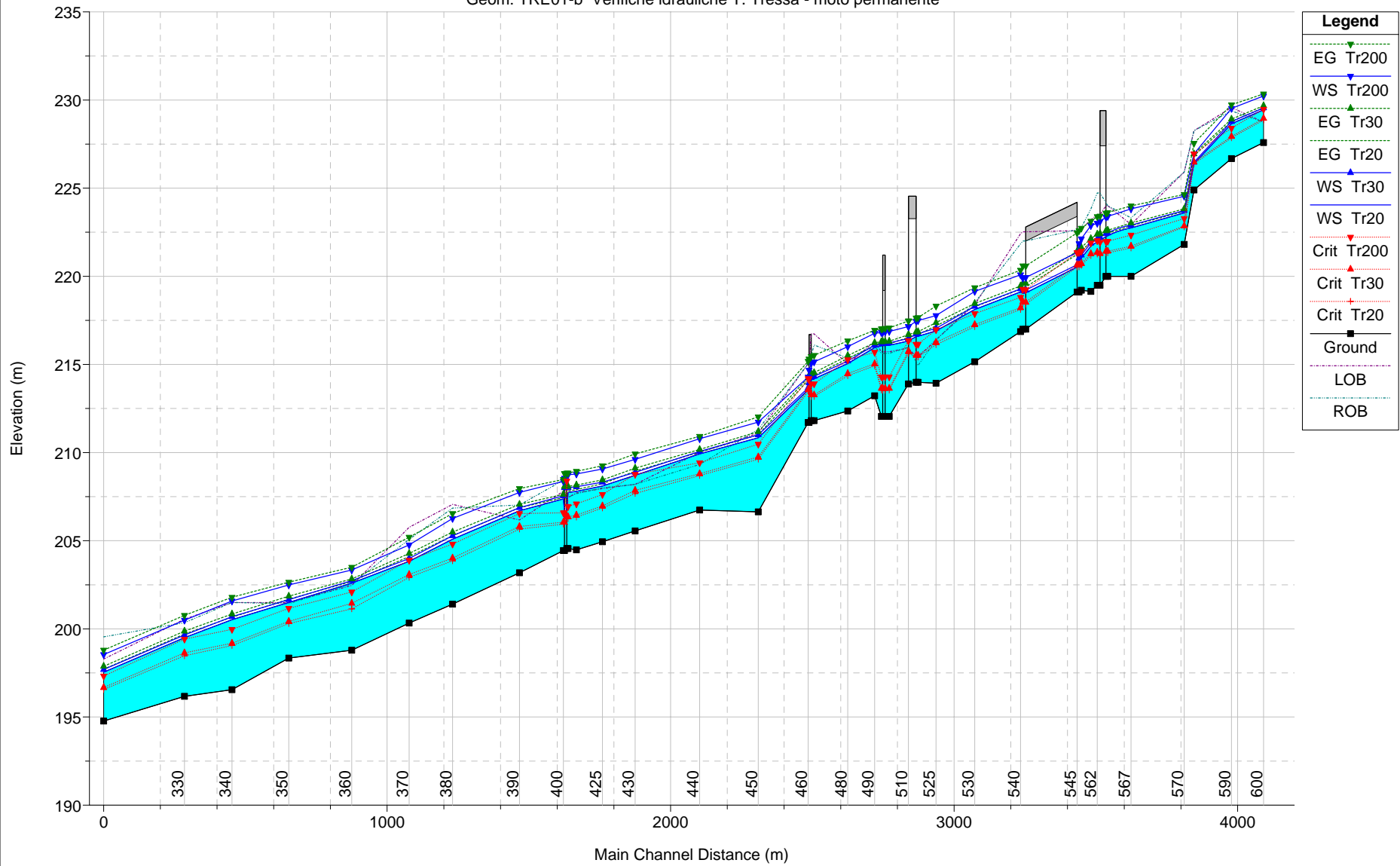
Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Vel Total (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
TRESSA	492	Tr200	91.00		91.00		212.05	216.81	214.29	217.02	0.001986	2.04	2.04	44.53	73.00	0.30	0.30
TRESSA	490	Tr20	48.00		48.00		213.22	215.95	214.92	216.08	0.006029	1.60	1.60	30.00	20.33	0.42	0.42
TRESSA	490	Tr30	54.00		53.96	0.04	213.22	216.10	215.03	216.23	0.005784	1.63	1.62	33.29	26.87	0.42	0.47
TRESSA	490	Tr200	95.00	1.18	88.79	5.03	213.22	216.76	215.70	216.94	0.004857	1.88	1.62	58.71	49.88	0.40	0.48
TRESSA	480	Tr20	48.00	0.00	48.00		212.36	215.05	214.36	215.33	0.010809	2.36	2.36	20.38	11.84	0.56	0.57
TRESSA	480	Tr30	54.00	0.10	53.90		212.36	215.20	214.48	215.50	0.010745	2.45	2.41	22.43	16.39	0.56	0.66
TRESSA	480	Tr200	95.00	10.19	84.45	0.36	212.36	216.01	215.27	216.34	0.008302	2.69	2.03	46.79	46.44	0.52	0.65
TRESSA	470	Tr20	48.00		48.00		211.81	214.18	213.18	214.37	0.004538	1.93	1.93	24.87	14.89	0.41	0.41
TRESSA	470	Tr30	54.00		54.00		211.81	214.32	213.27	214.54	0.004699	2.04	2.04	26.41	15.12	0.42	0.42
TRESSA	470	Tr200	95.00		95.00		211.81	215.15	213.90	215.51	0.005432	2.68	2.68	35.49	57.86	0.48	0.48
TRESSA	465 BR U	Tr20	48.00		48.00		211.81	214.12	213.17	214.32	0.004991	1.99	1.99	24.17	11.03	0.43	0.43
TRESSA	465 BR U	Tr30	54.00		54.00		211.81	214.26	213.27	214.48	0.005174	2.10	2.10	25.66	11.03	0.44	0.44
TRESSA	465 BR U	Tr200	95.00		95.00		211.81	215.06	213.89	215.45	0.005928	2.75	2.75	34.57	11.03	0.50	0.50
TRESSA	465 BR D	Tr20	48.00		48.00		211.71	213.84	213.48	214.21	0.014439	2.69	2.69	17.81	11.03	0.68	0.68
TRESSA	465 BR D	Tr30	54.00		54.00		211.71	213.96	213.58	214.37	0.014446	2.82	2.82	19.12	11.03	0.68	0.68
TRESSA	465 BR D	Tr200	95.00		95.00		211.71	214.68	214.19	215.31	0.014040	3.51	3.51	27.06	11.03	0.72	0.72
TRESSA	460	Tr20	48.00		48.00		211.71	213.56	213.47	214.10	0.027143	3.26	3.26	14.74	16.53	0.90	0.90
TRESSA	460	Tr30	54.00		54.00		211.71	213.67	213.58	214.26	0.026482	3.39	3.39	15.94	17.34	0.90	0.90
TRESSA	460	Tr200	95.00		95.00		211.71	214.29	214.20	215.18	0.025249	4.19	4.19	22.69	42.26	0.93	0.93
TRESSA	450	Tr20	48.00		48.00		206.64	210.84	209.62	211.01	0.005927	1.83	1.83	26.26	12.33	0.40	0.40
TRESSA	450	Tr30	54.00		54.00		206.64	211.00	209.75	211.19	0.006139	1.91	1.91	28.24	12.72	0.41	0.41
TRESSA	450	Tr200	95.00	1.27	91.96	1.77	206.64	211.73	210.47	212.02	0.007110	2.44	2.14	44.31	35.63	0.46	0.61
TRESSA	440	Tr20	48.00		46.99	1.01	206.74	209.92	208.70	210.03	0.003408	1.44	1.35	35.65	27.40	0.33	0.38
TRESSA	440	Tr30	54.00	0.00	52.20	1.80	206.74	210.07	208.80	210.18	0.003350	1.49	1.35	39.88	31.22	0.33	0.38
TRESSA	440	Tr200	95.00	1.89	82.60	10.51	206.74	210.79	209.42	210.92	0.003083	1.75	1.34	71.13	56.06	0.34	0.38
TRESSA	430	Tr20	48.00	0.12	47.05	0.83	205.56	208.71	207.68	208.94	0.007710	2.16	2.00	23.98	18.42	0.46	0.56
TRESSA	430	Tr30	54.00	0.25	52.02	1.73	205.56	208.88	207.85	209.12	0.007377	2.22	1.98	27.30	21.23	0.46	0.56
TRESSA	430	Tr200	95.00	1.79	80.96	12.26	205.56	209.62	208.77	209.92	0.007229	2.63	2.00	47.57	33.60	0.48	0.54
TRESSA	425	Tr20	48.00	0.04	47.96	0.00	204.94	208.11	206.85	208.23	0.004013	1.57	1.56	30.79	18.49	0.35	0.39
TRESSA	425	Tr30	54.00	0.33	53.64	0.03	204.94	208.32	206.97	208.45	0.003556	1.59	1.53	35.26	22.45	0.34	0.39
TRESSA	425	Tr200	95.00	5.48	88.85	0.67	204.94	209.07	207.62	209.25	0.003725	1.97	1.67	56.97	35.92	0.36	0.42
TRESSA	420	Tr20	53.00	0.01	52.99	0.00	204.48	207.80	206.34	207.90	0.003041	1.40	1.40	37.96	20.31	0.31	0.33
TRESSA	420	Tr30	60.00	0.29	59.66	0.06	204.48	208.06	206.46	208.16	0.002631	1.41	1.36	44.13	27.37	0.29	0.34
TRESSA	420	Tr200	105.00	6.16	97.86	0.98	204.48	208.79	207.09	208.94	0.002919	1.77	1.47	71.32	47.22	0.32	0.38
TRESSA	410	Tr20	53.00	0.44	52.54	0.01	204.56	207.73	206.25	207.82	0.002253	1.26	1.20	44.00	32.49	0.28	0.33
TRESSA	410	Tr30	60.00	1.82	58.11	0.07	204.56	208.01	206.36	208.08	0.001842	1.24	1.11	54.06	39.71	0.25	0.30
TRESSA	410	Tr200	105.00	11.83	92.46	0.71	204.56	208.74	206.94	208.84	0.001918	1.51	1.20	87.47	51.34	0.27	0.29
TRESSA	405 BR U	Tr20	53.00		53.00		204.56	206.68	206.24	207.81	0.013646	2.36	2.36	22.43	16.00	0.64	0.64

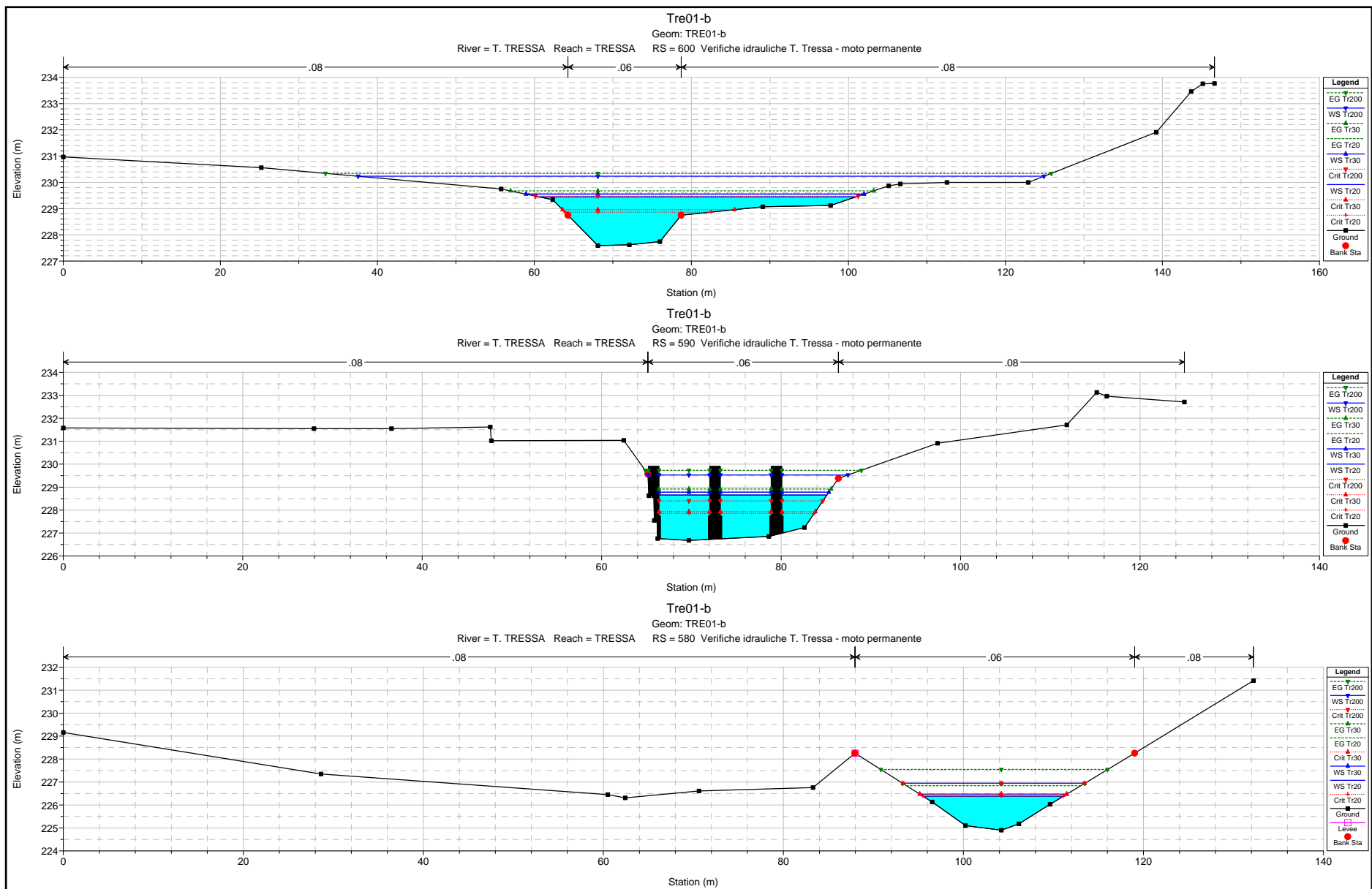
HEC-RAS Plan: Tre01-b River: T. TRESSA Reach: TRESSA (Continued)

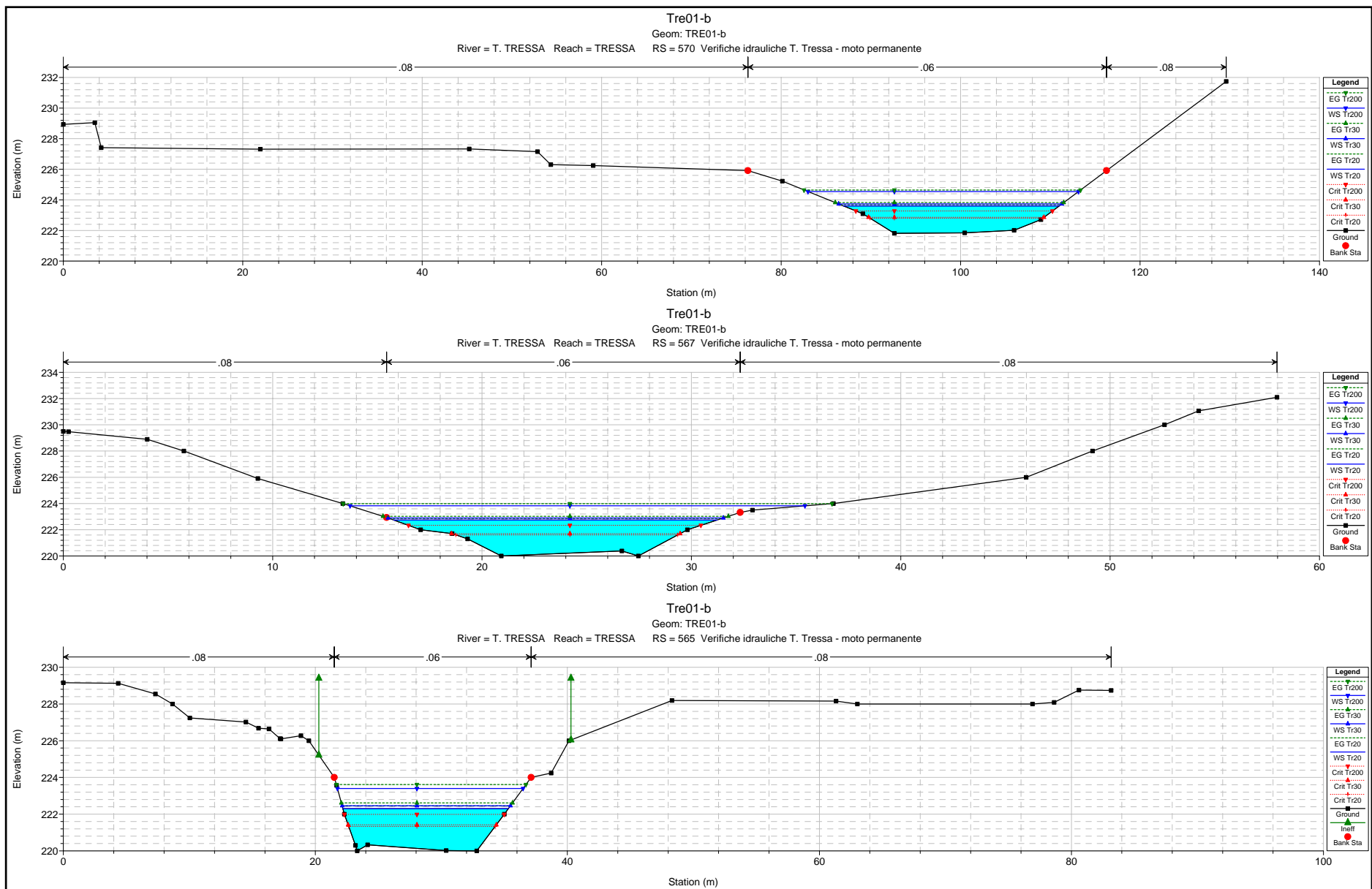
Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Vel Total (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
TRESSA	405 BR U	Tr30	60.00	0.08	59.86	0.01	204.56	208.01	206.35	208.08		2.63	2.60	23.06	39.71	0.50	0.50
TRESSA	405 BR U	Tr200	105.00	17.97	85.25	1.77	204.56	208.74	208.39	208.84		2.30	1.86	56.48	51.34	0.32	0.32
TRESSA	405 BR D	Tr20	53.00		53.00		204.44	206.68	205.94	207.44	0.007051	1.79	1.79	29.53	19.49	0.47	0.47
TRESSA	405 BR D	Tr30	60.00	0.05	59.90		204.44	208.01	206.05	208.08		2.00	1.99	30.12	37.59	0.38	0.38
TRESSA	405 BR D	Tr200	105.00	10.35	93.86	0.79	204.44	208.55	206.59	208.81		2.13	1.99	52.78	45.91	0.35	0.35
TRESSA	400	Tr20	53.00		53.00		204.44	207.37	205.94	207.44	0.002308	1.20	1.20	44.21	23.00	0.28	0.28
TRESSA	400	Tr30	60.00	0.07	59.93		204.44	207.55	206.05	207.63	0.002300	1.24	1.22	49.07	32.23	0.28	0.32
TRESSA	400	Tr200	105.00	4.75	100.25		204.44	208.37	206.58	208.48	0.002218	1.45	1.31	80.08	42.71	0.28	0.31
TRESSA	390	Tr20	53.00	0.13	52.87		203.18	206.70	205.66	206.87	0.007105	1.85	1.83	28.88	17.55	0.45	0.46
TRESSA	390	Tr30	60.00	0.29	59.71		203.18	206.88	205.81	207.06	0.006915	1.89	1.86	32.19	18.95	0.45	0.46
TRESSA	390	Tr200	105.00	2.18	99.01	3.81	203.18	207.74	206.54	207.96	0.005299	2.10	1.80	58.41	45.21	0.42	0.50
TRESSA	380	Tr20	53.00		53.00		201.40	205.09	203.86	205.28	0.006381	1.94	1.94	27.28	12.90	0.43	0.43
TRESSA	380	Tr30	60.00		60.00		201.40	205.28	204.02	205.49	0.006439	2.01	2.01	29.84	13.49	0.43	0.43
TRESSA	380	Tr200	105.00		105.00		201.40	206.26	204.81	206.55	0.006777	2.36	2.36	44.54	16.49	0.46	0.46
TRESSA	370	Tr20	53.00		53.00		200.33	203.83	202.92	204.10	0.009691	2.28	2.28	23.24	11.99	0.52	0.52
TRESSA	370	Tr30	60.00		60.00		200.33	203.99	203.08	204.28	0.010065	2.38	2.38	25.18	12.51	0.54	0.54
TRESSA	370	Tr200	105.00		105.00		200.33	204.76	203.89	205.20	0.012130	2.93	2.93	35.86	15.07	0.61	0.61
TRESSA	360	Tr20	53.00	0.02	52.97	0.00	198.79	202.59	201.13	202.69	0.003716	1.35	1.34	39.55	26.59	0.33	0.35
TRESSA	360	Tr30	60.00	0.17	59.82	0.01	198.79	202.74	201.45	202.84	0.003622	1.40	1.38	43.59	30.62	0.33	0.37
TRESSA	360	Tr200	105.00	3.88	100.29	0.82	198.79	203.34	202.09	203.49	0.003905	1.76	1.56	67.43	47.95	0.36	0.42
TRESSA	350	Tr20	60.00	0.00	59.99	0.01	198.34	201.49	200.30	201.68	0.005638	1.92	1.91	31.35	17.68	0.42	0.46
TRESSA	350	Tr30	67.00	0.00	66.72	0.28	198.34	201.65	200.42	201.86	0.005509	1.99	1.92	34.85	26.24	0.42	0.53
TRESSA	350	Tr200	117.00	10.81	90.89	15.30	198.34	202.49	201.16	202.65	0.003694	2.00	1.19	98.26	116.55	0.36	0.41
TRESSA	340	Tr20	60.00		60.00		196.55	200.52	199.05	200.66	0.004427	1.67	1.67	35.96	17.38	0.37	0.37
TRESSA	340	Tr30	67.00		67.00		196.55	200.69	199.18	200.84	0.004506	1.72	1.72	38.94	18.23	0.38	0.38
TRESSA	340	Tr200	117.00	0.02	116.91	0.06	196.55	201.58	199.98	201.79	0.004970	2.04	2.02	58.03	42.59	0.41	0.55
TRESSA	330	Tr20	60.00		60.00		196.17	199.50	198.47	199.70	0.007876	2.01	2.01	29.78	16.99	0.49	0.49
TRESSA	330	Tr30	67.00		67.00		196.17	199.65	198.64	199.87	0.007903	2.06	2.06	32.47	17.96	0.49	0.49
TRESSA	330	Tr200	117.00		116.34	0.66	196.17	200.49	199.41	200.77	0.007766	2.34	2.20	53.23	73.29	0.50	0.82
TRESSA	320	Tr20	60.00		60.00		194.77	197.54	196.56	197.71	0.006009	1.85	1.85	32.40	17.71	0.44	0.44
TRESSA	320	Tr30	67.00		67.00		194.77	197.69	196.67	197.88	0.006005	1.91	1.91	35.12	18.33	0.44	0.44
TRESSA	320	Tr200	117.00	0.38	116.62		194.77	198.54	197.32	198.80	0.006004	2.24	2.18	53.70	33.61	0.46	0.55

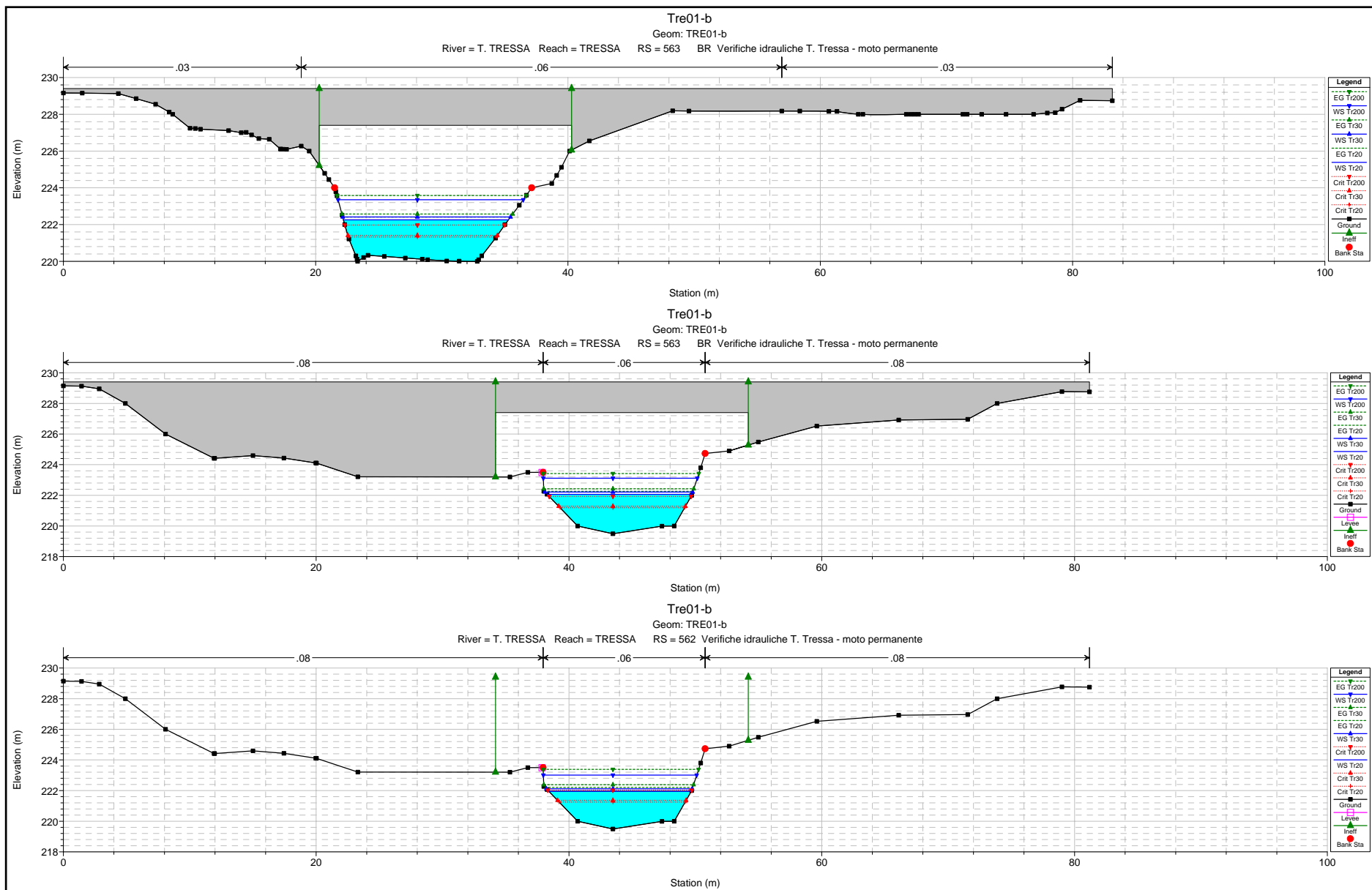
Tre01-b

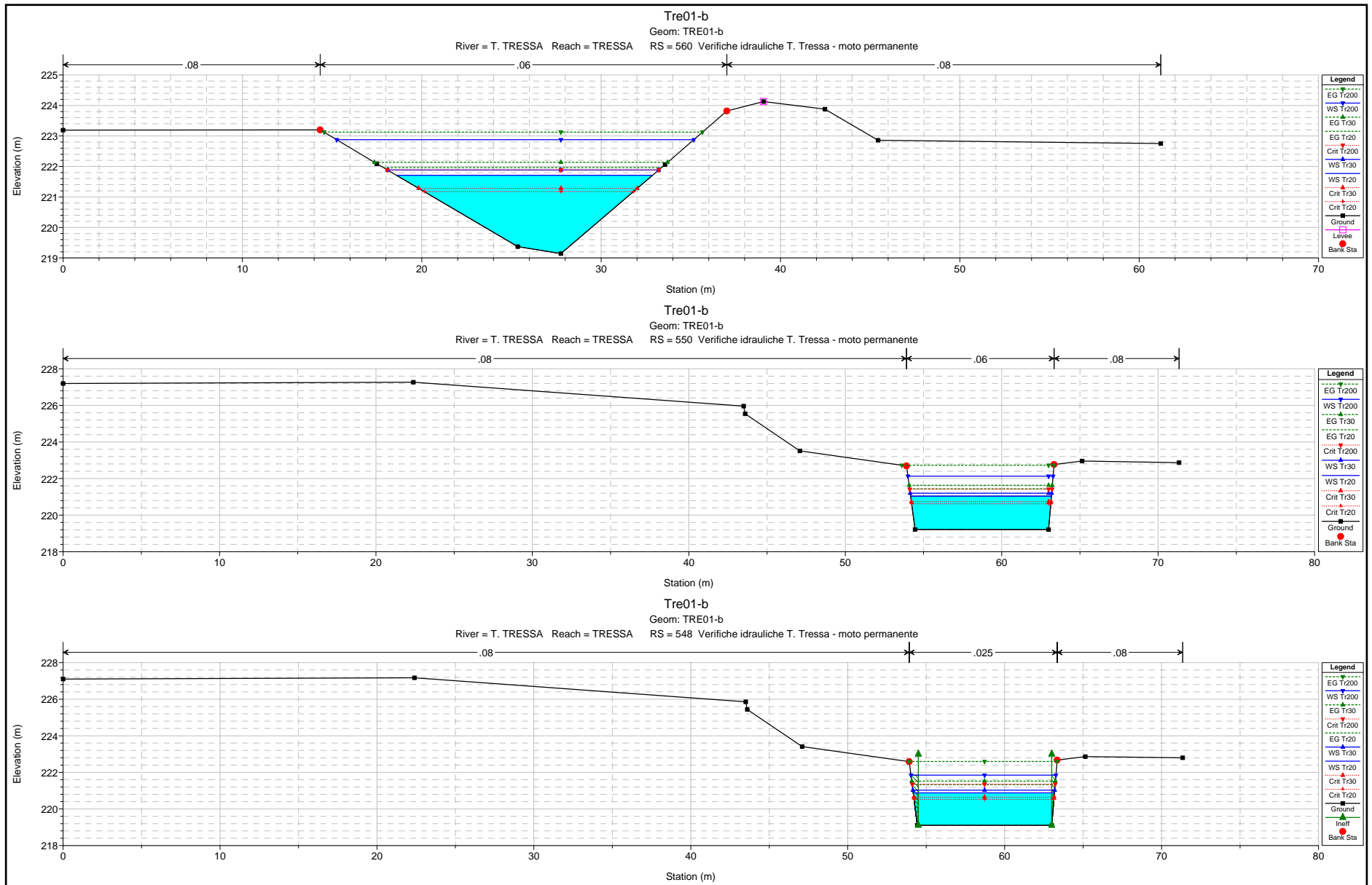
Geom: TRE01-b Verifiche idrauliche T. Tressa - moto permanente

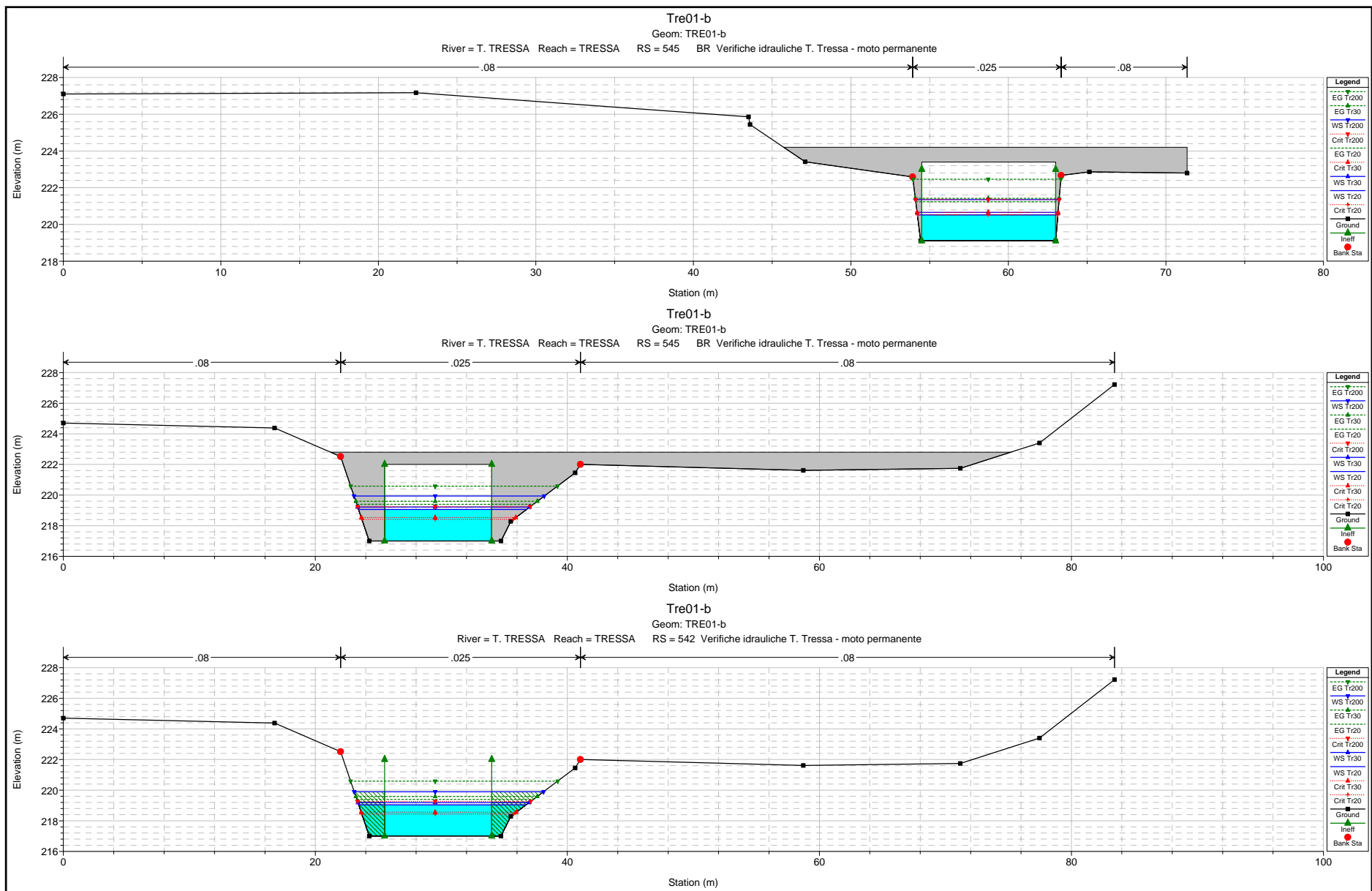


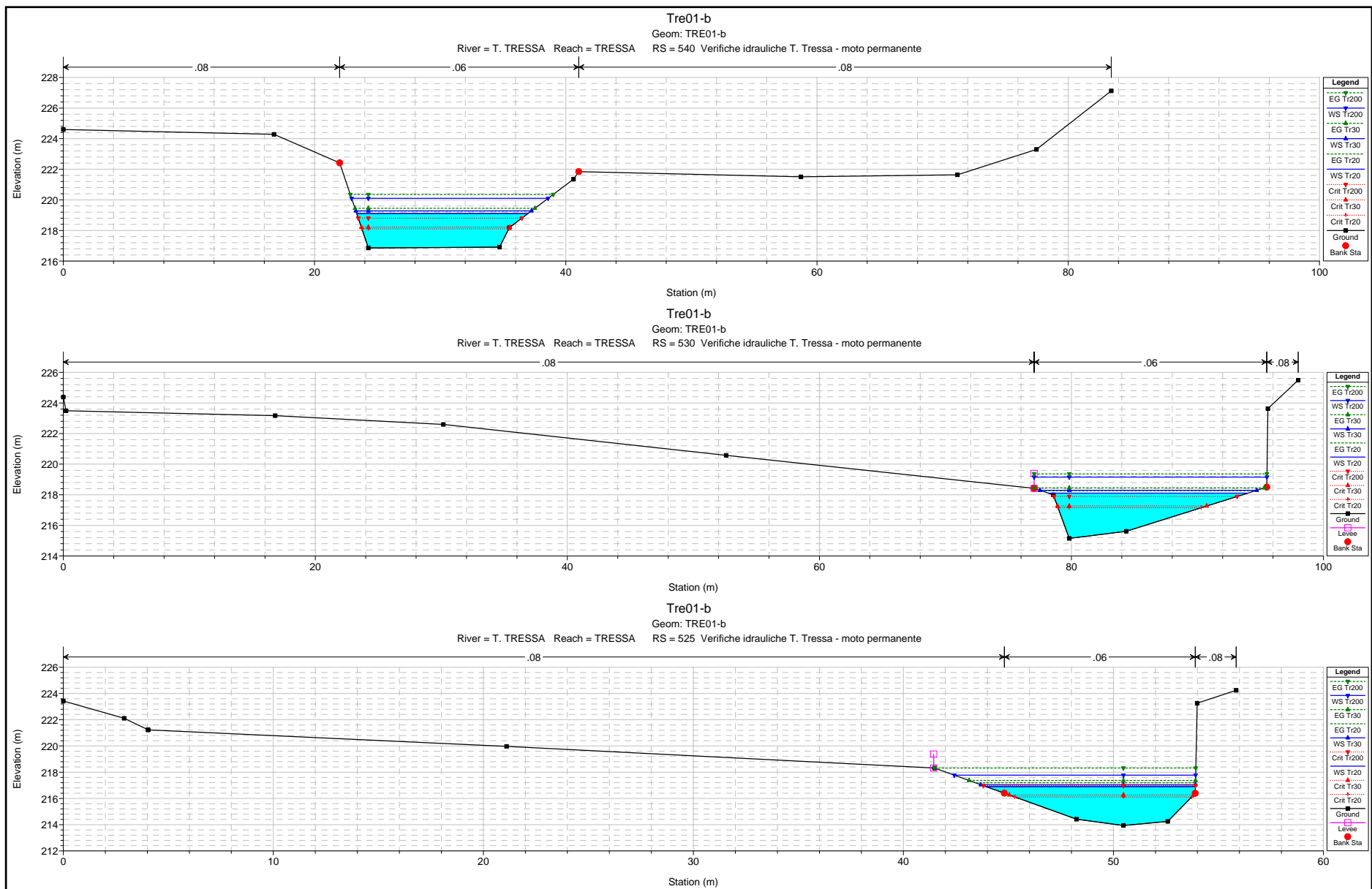


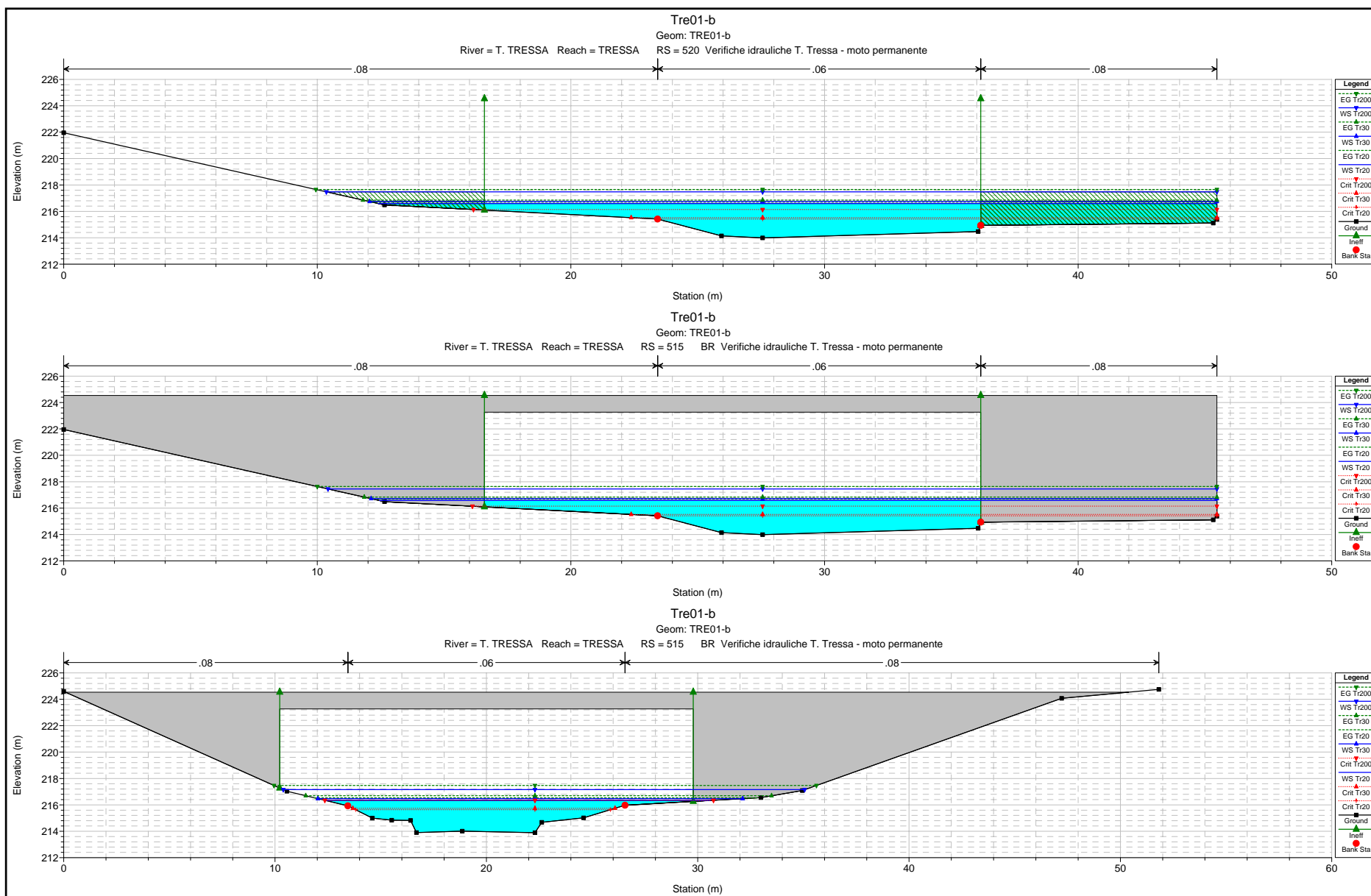


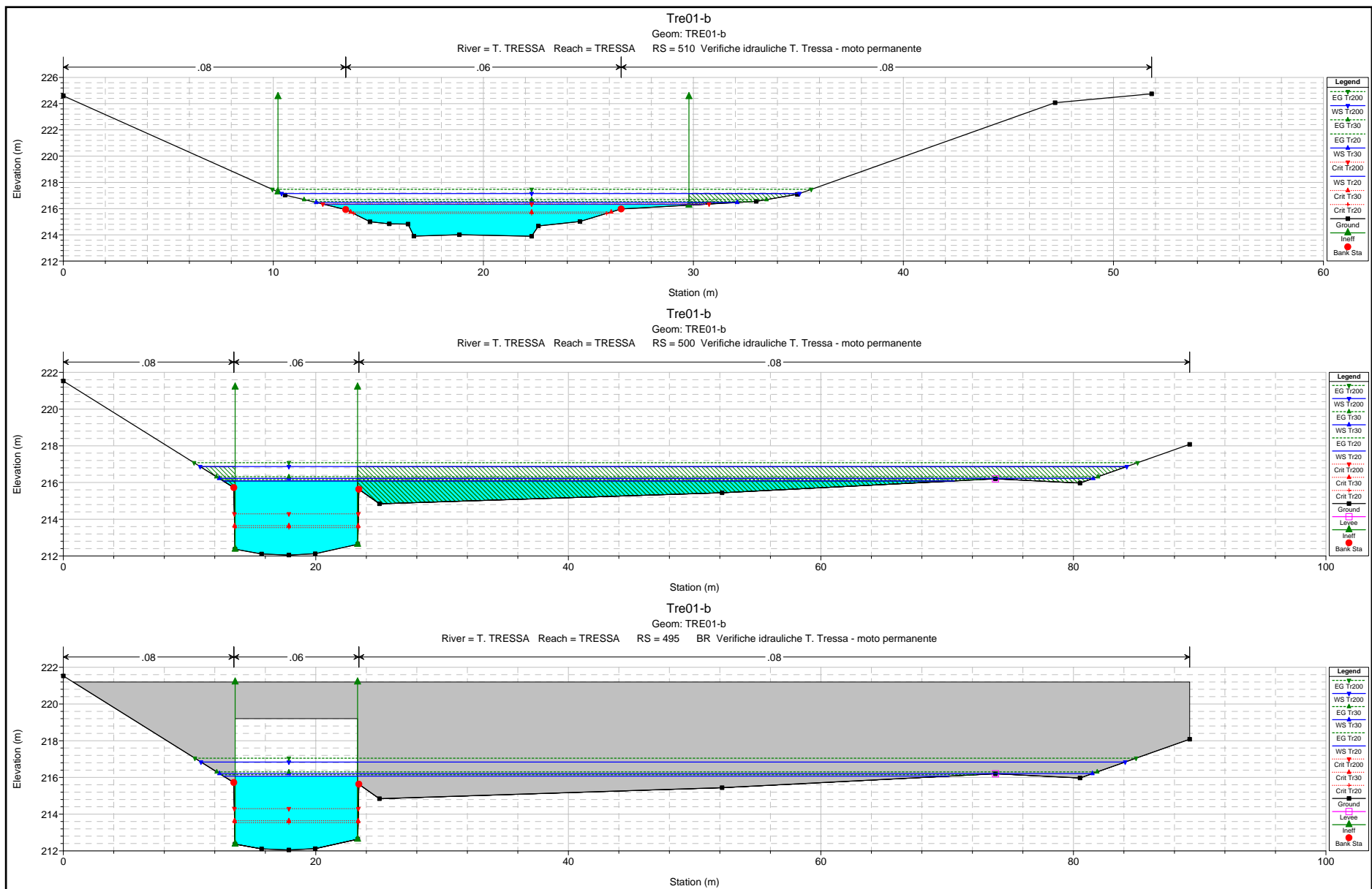


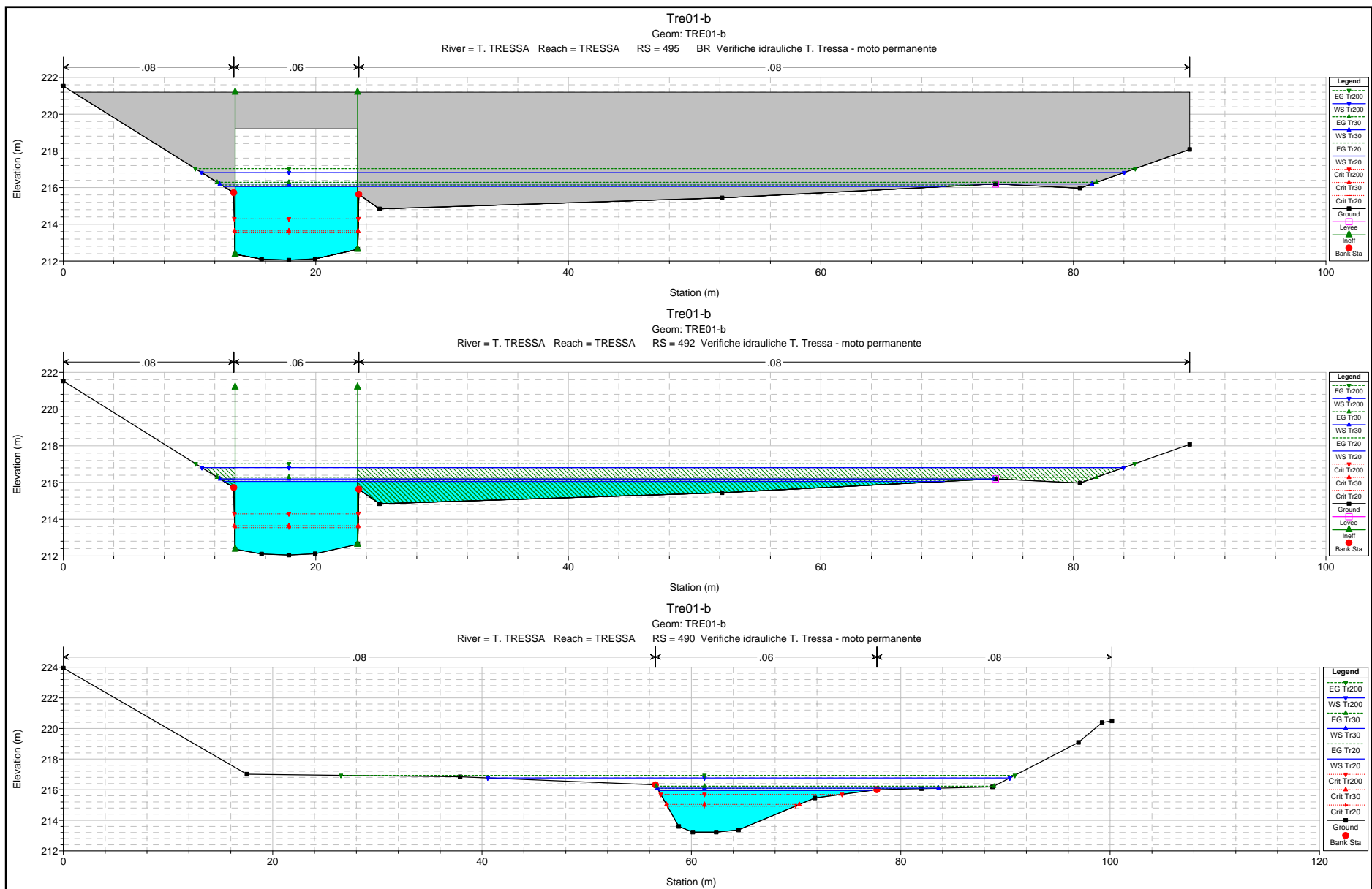


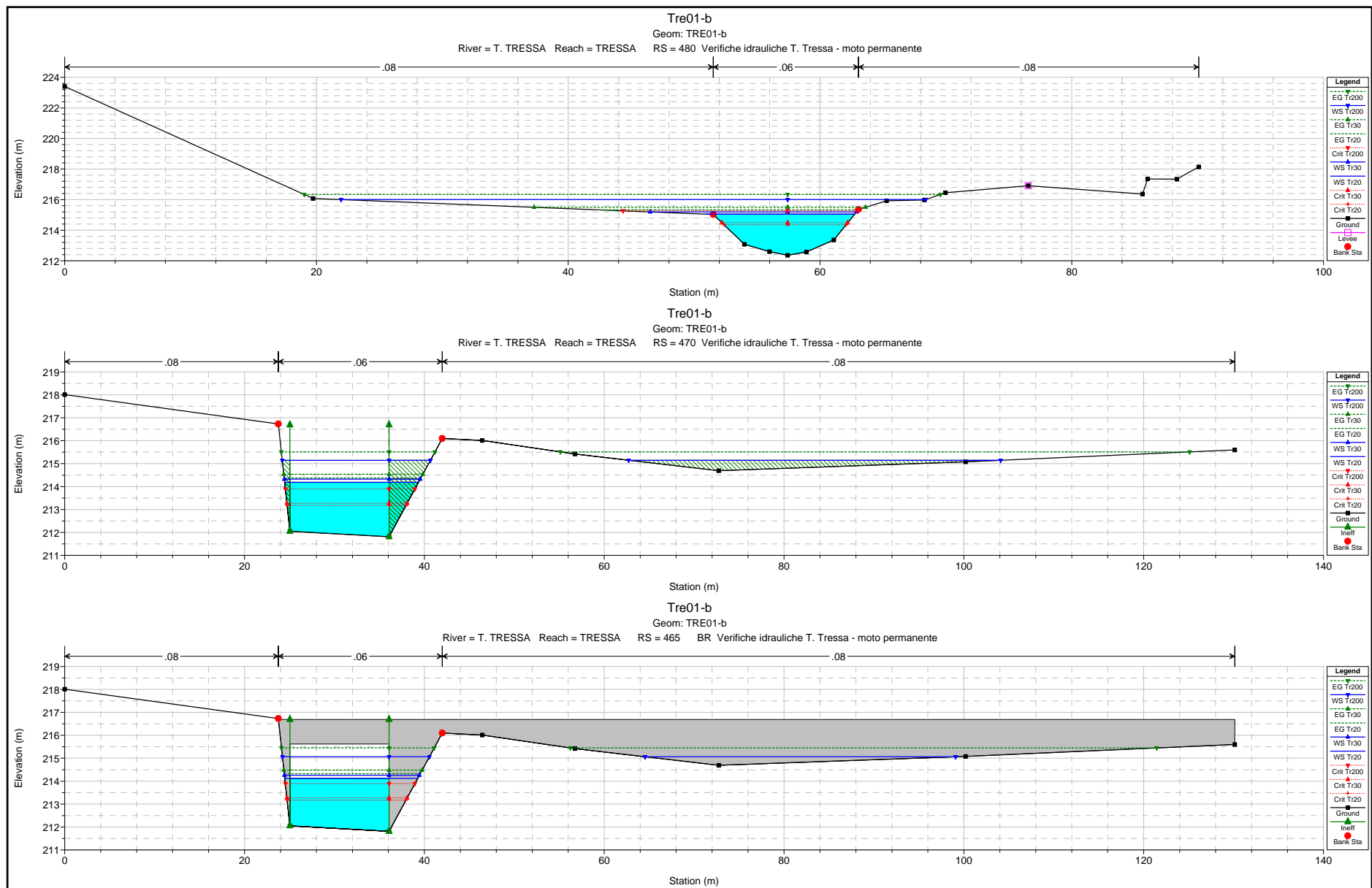


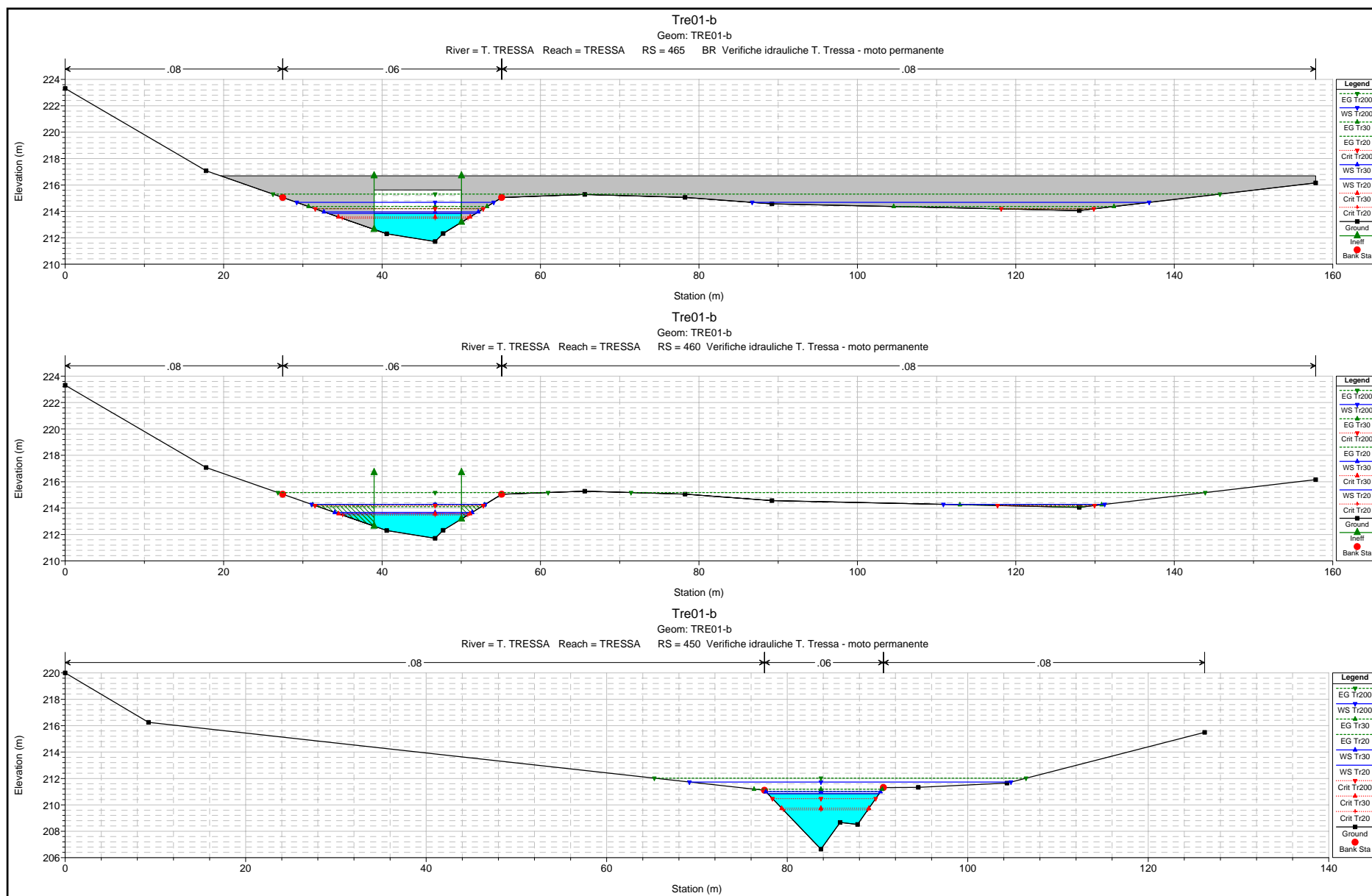


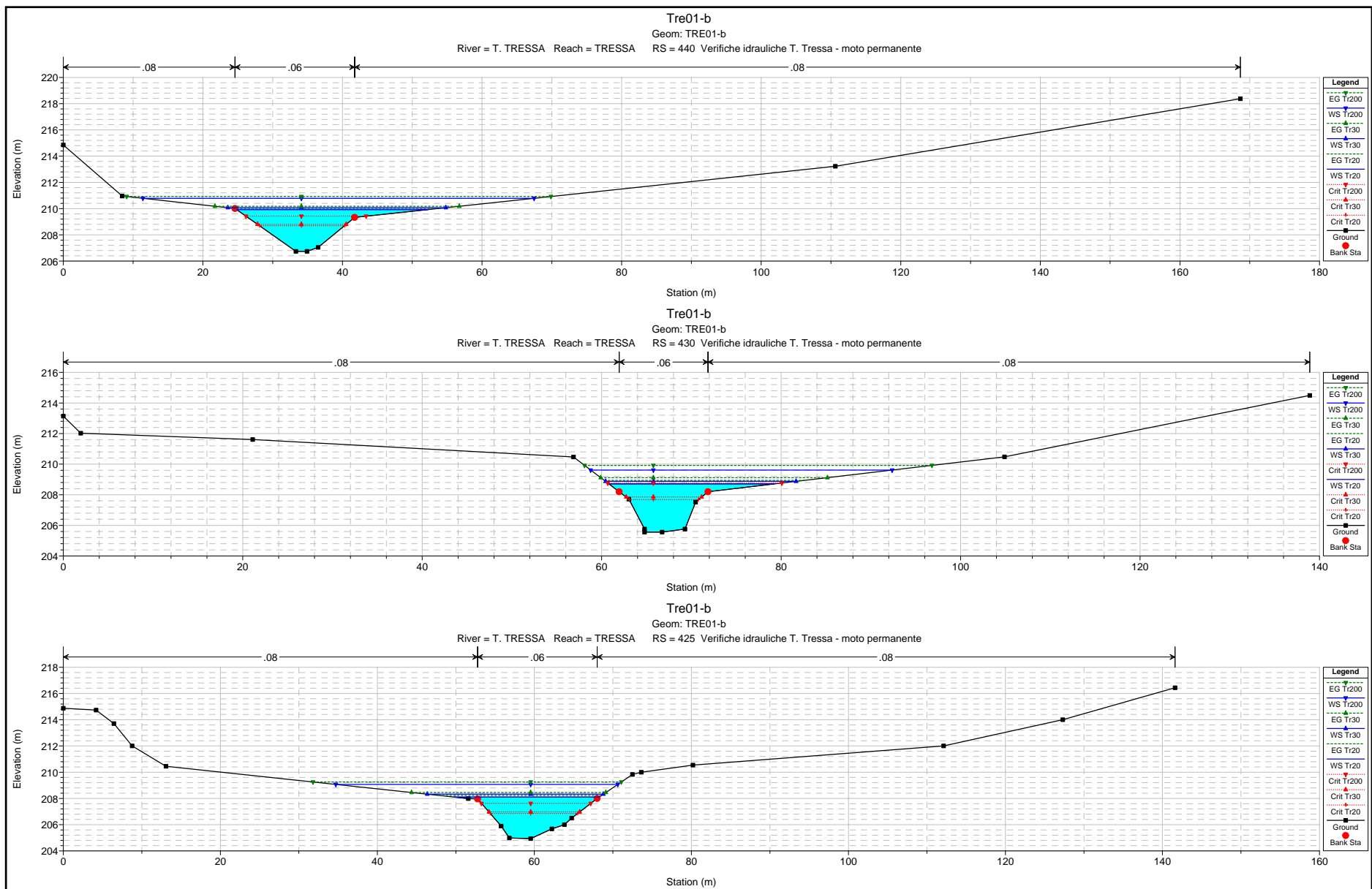


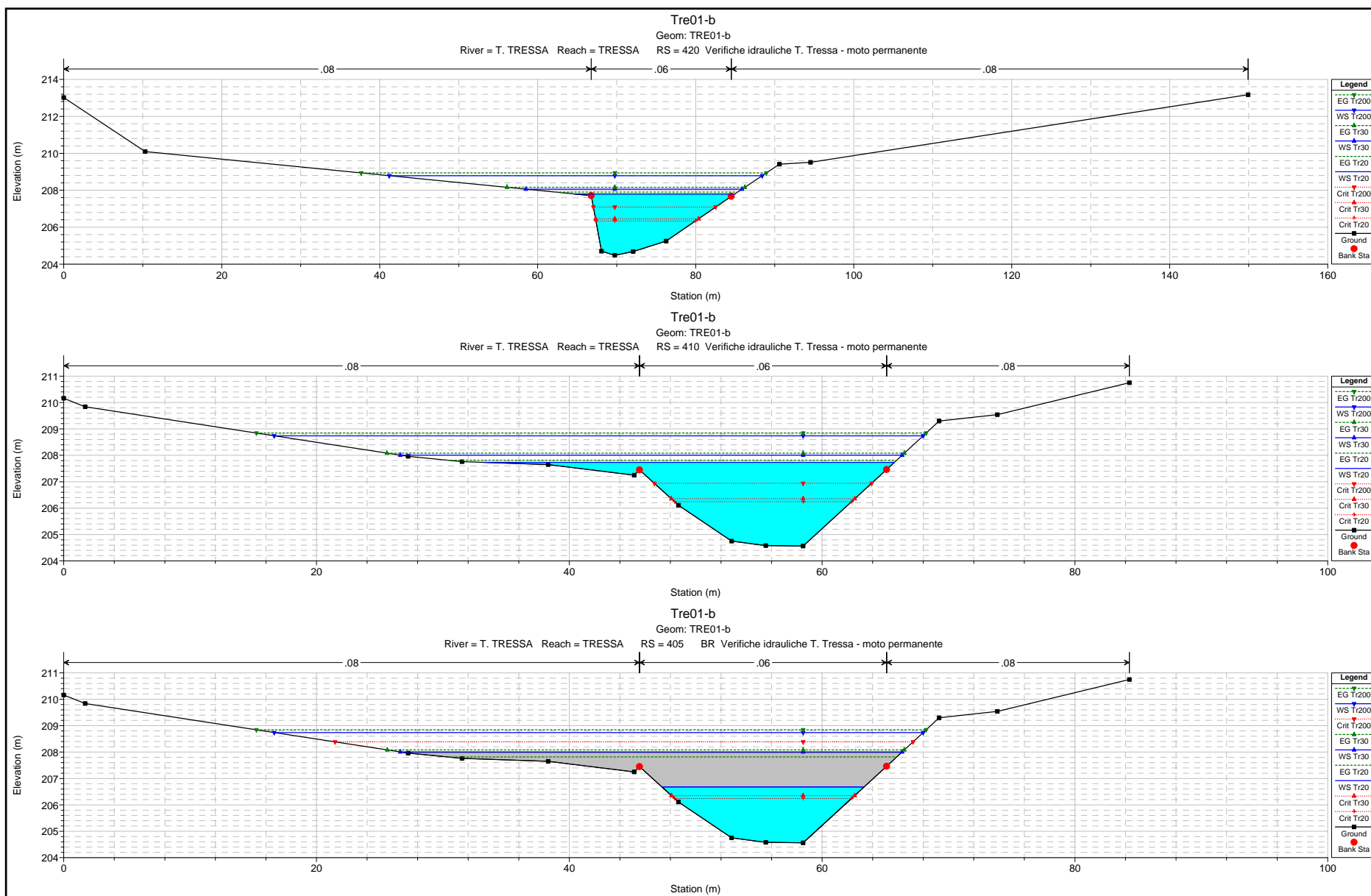


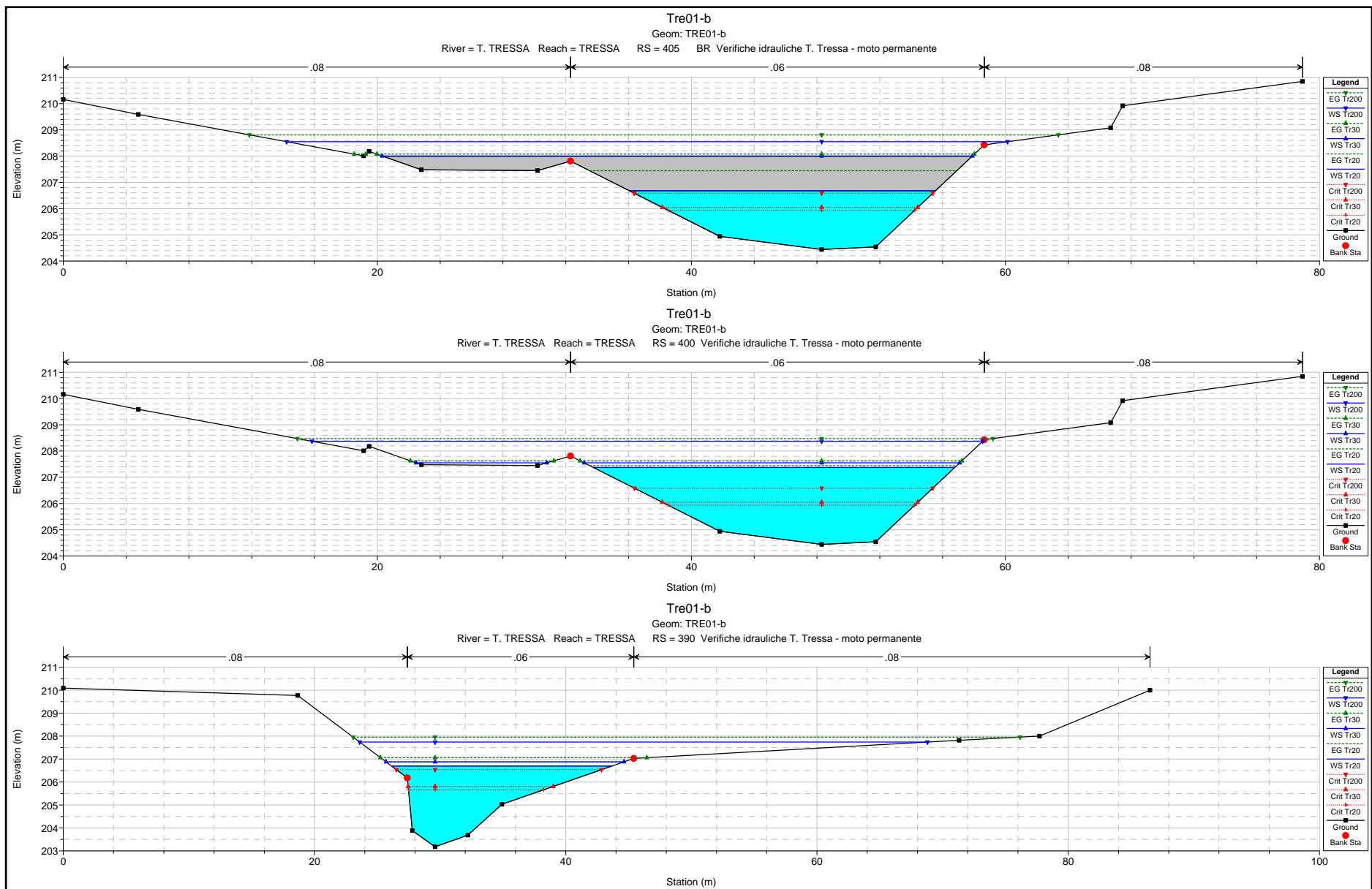


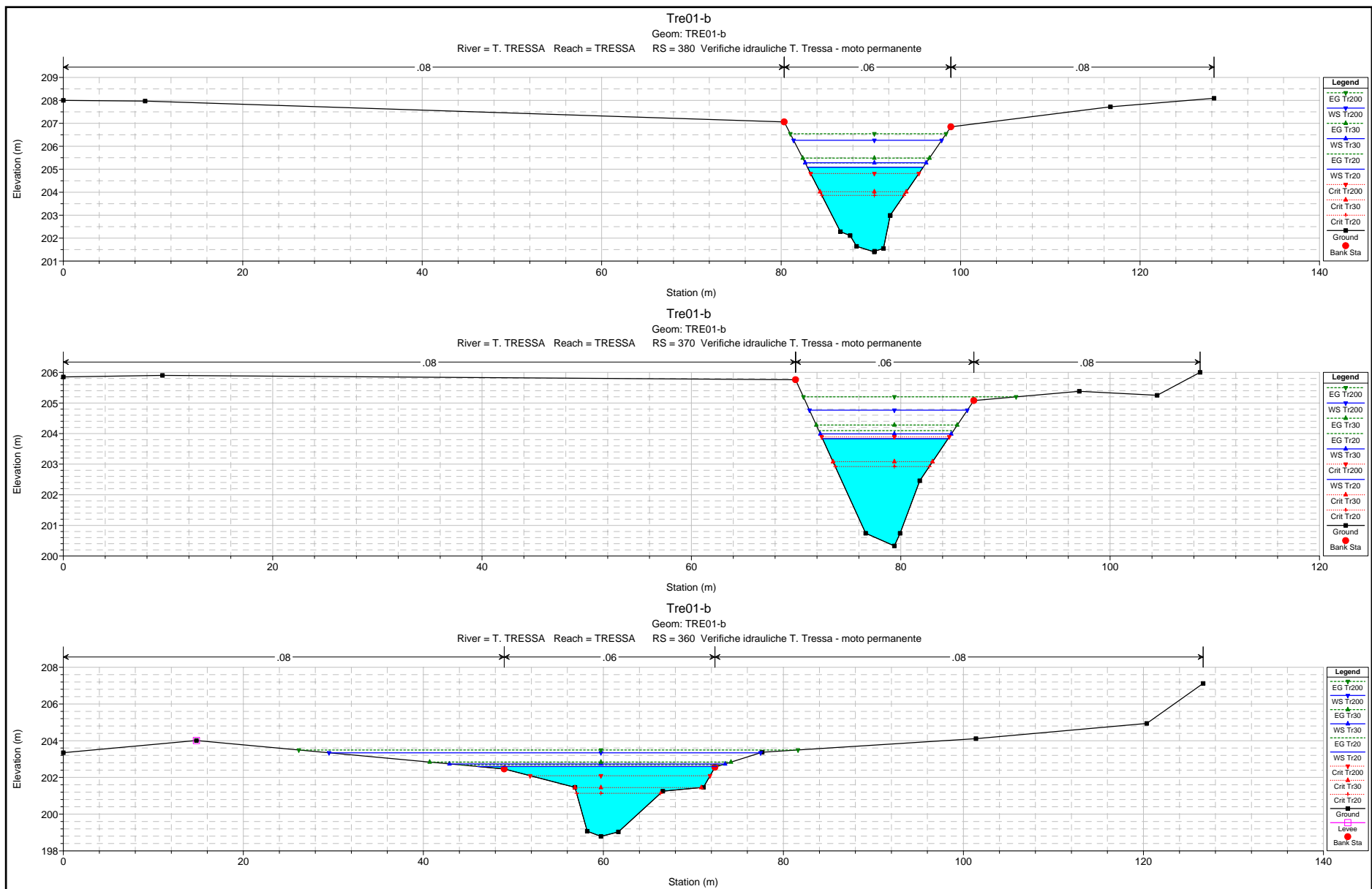


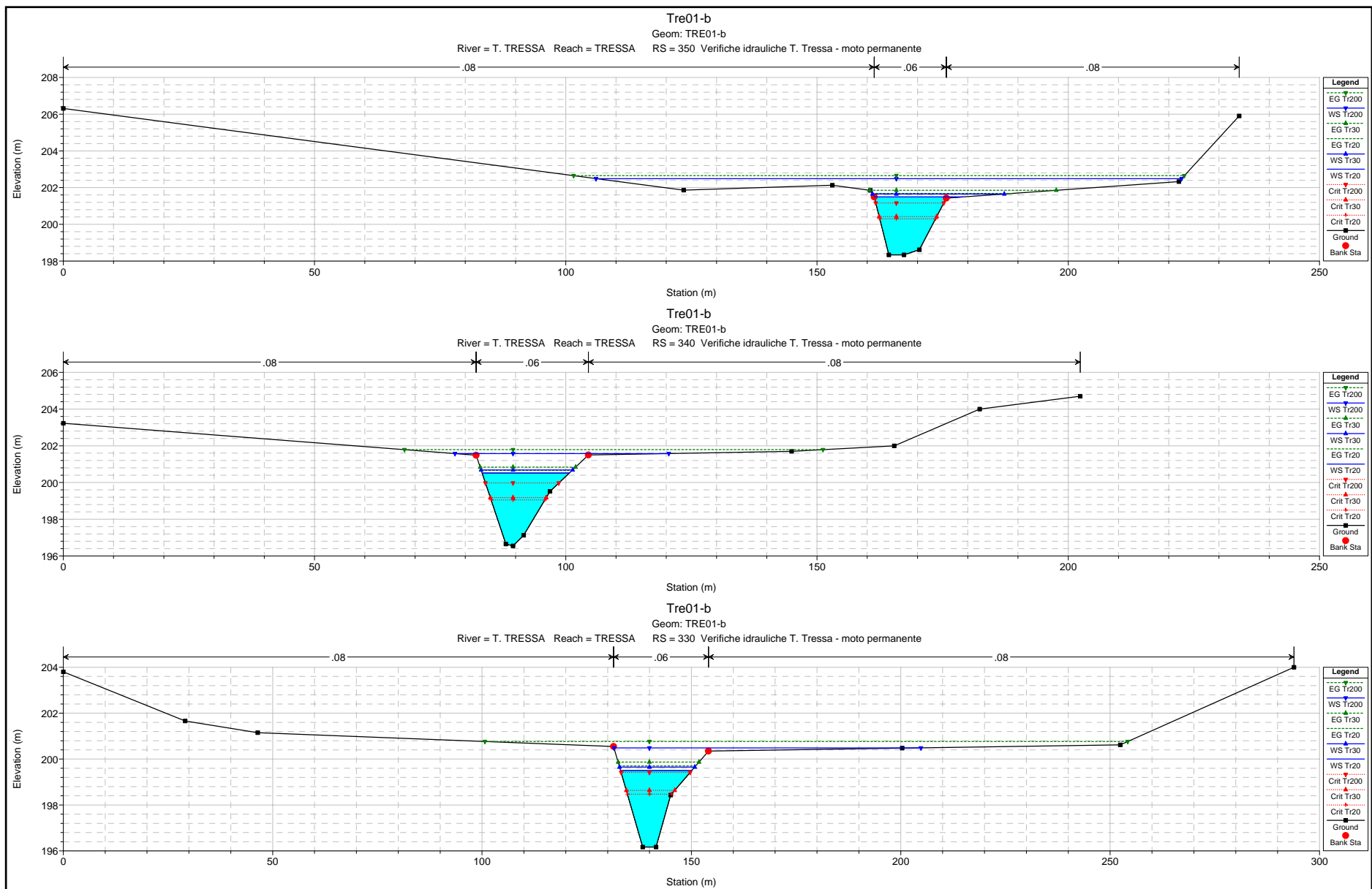












ALLEGATI DI CALCOLO HEC-RAS 3.1.3

TRATTO TRE02 – TORRENTE TRESSA

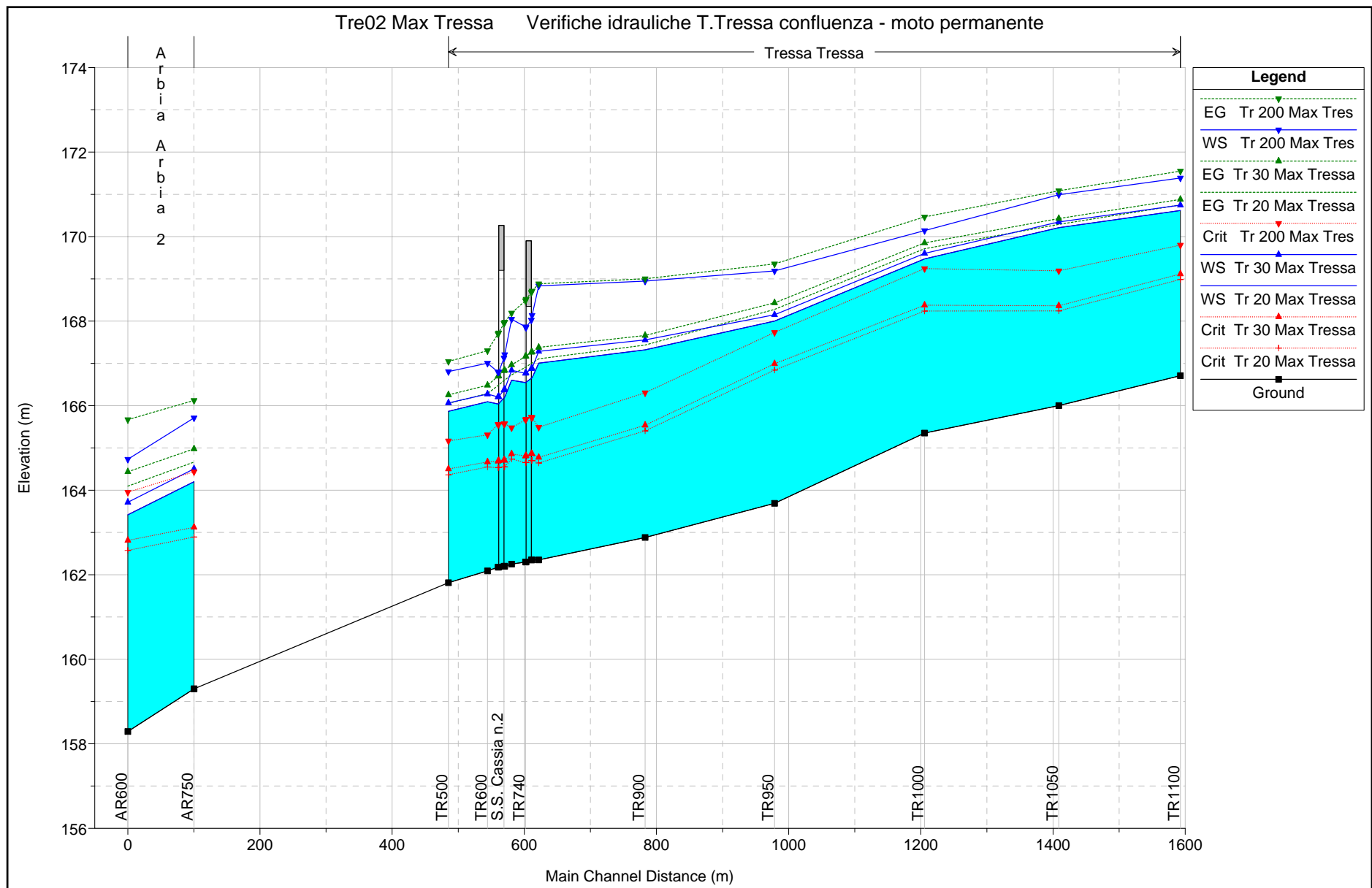
EVENTO CON PORTATA MASSIMA T. TRESSA ($D_{cr} = 3.47$)

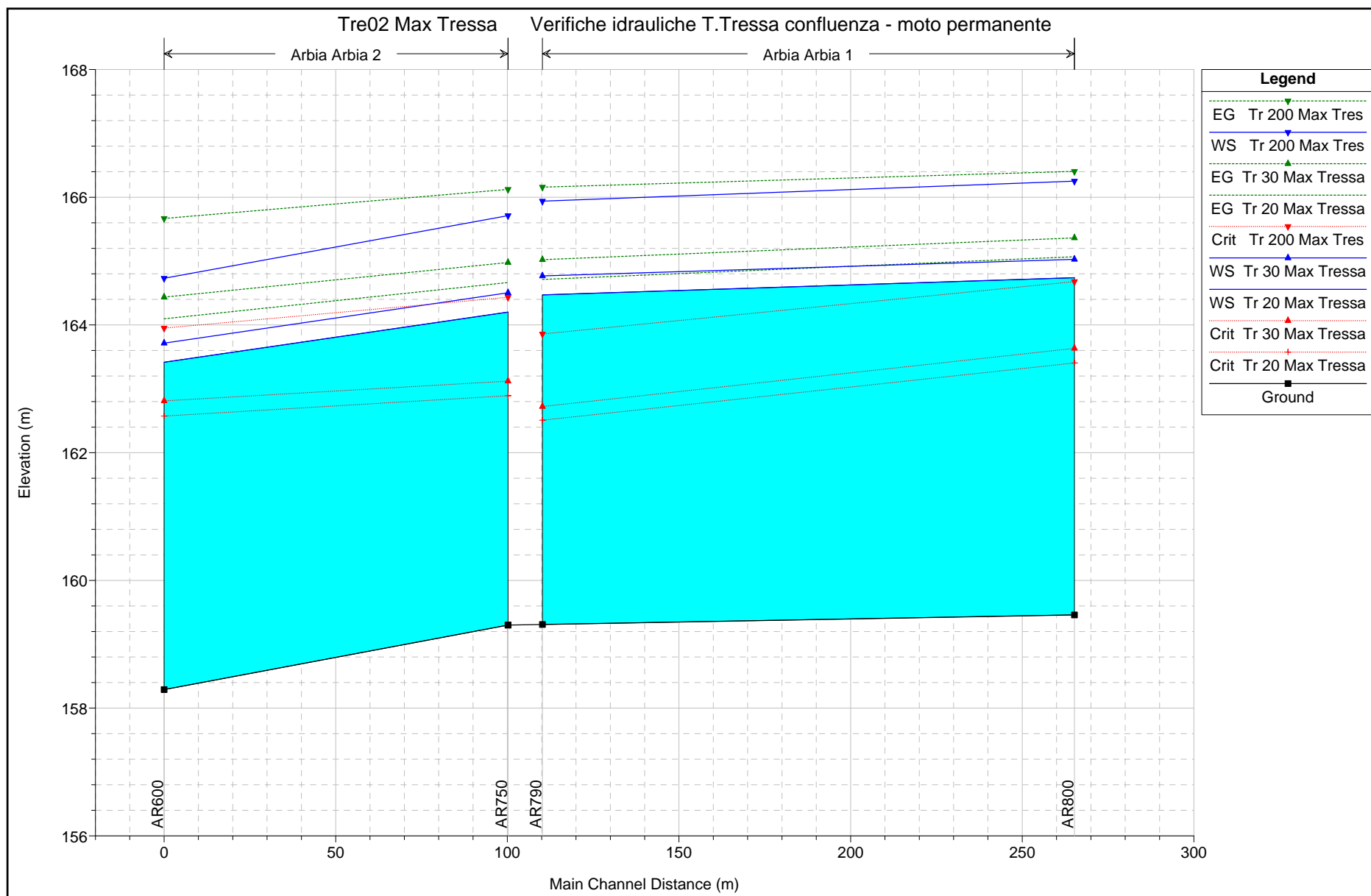
HEC-RAS Plan: TRE02_MT

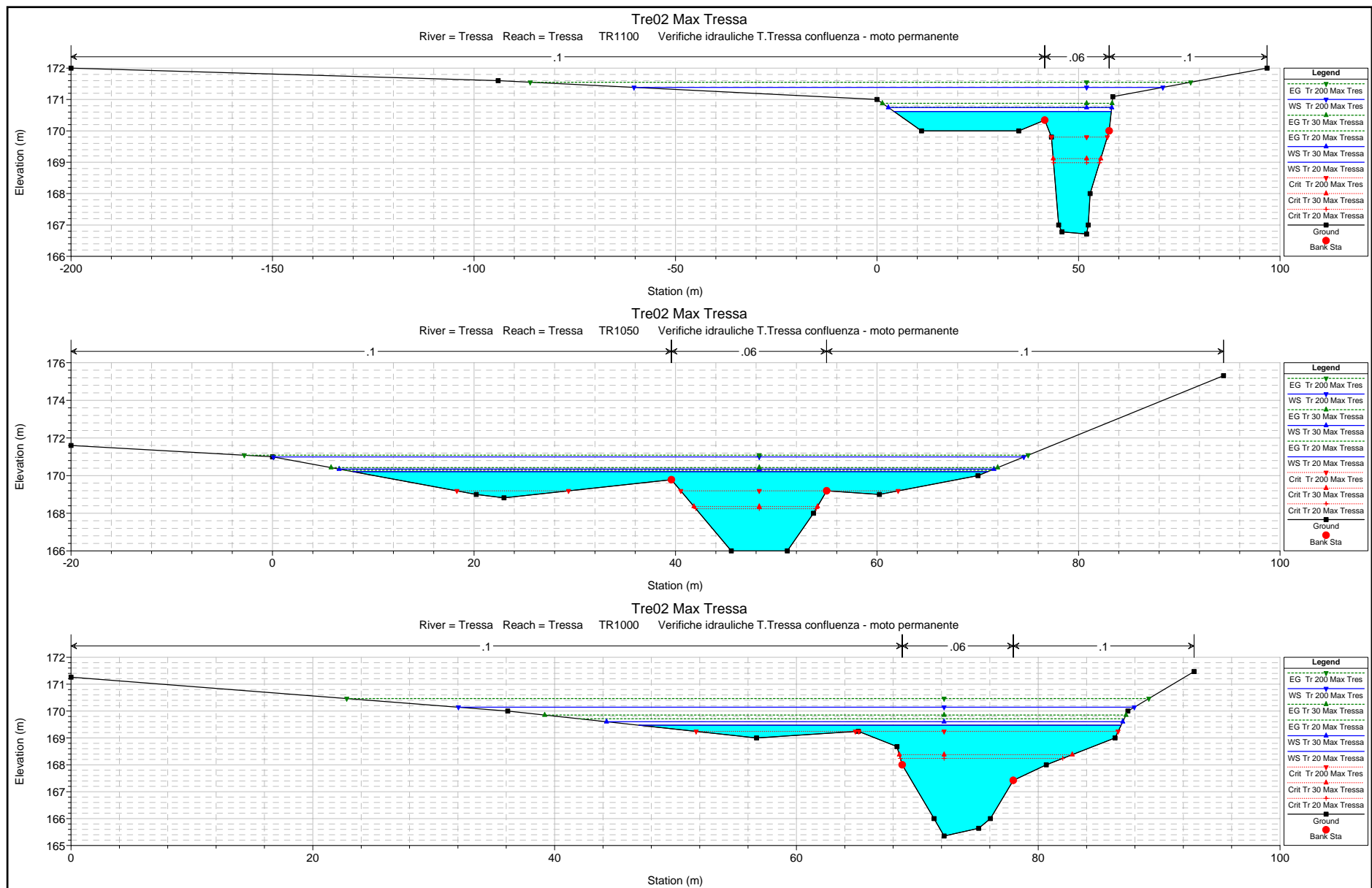
River	Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Total (m/s)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
Tressa	Tressa	1100	Tr 20 Max Tressa	79.24	7.71	71.50	0.03	166.71	170.62	168.98	170.75	0.003490	1.27	1.69	62.34	53.91	0.33	0.38
Tressa	Tressa	1100	Tr 30 Max Tressa	87.26	10.72	76.49	0.05	166.71	170.75	169.12	170.88	0.003411	1.26	1.73	69.35	55.43	0.33	0.36
Tressa	Tressa	1100	Tr 200 Max Tres	136.08	26.64	108.95	0.50	166.71	171.39	169.80	171.55	0.003464	1.14	2.00	119.78	131.23	0.35	0.38
Tressa	Tressa	1050	Tr 20 Max Tressa	79.24	9.65	64.90	4.69	166.00	170.21	168.24	170.29	0.001774	0.91	1.36	86.65	62.99	0.25	0.25
Tressa	Tressa	1050	Tr 30 Max Tressa	87.26	12.08	69.27	5.91	166.00	170.35	168.36	170.43	0.001751	0.92	1.39	95.35	64.99	0.25	0.24
Tressa	Tressa	1050	Tr 200 Max Tres	136.08	27.84	94.42	13.82	166.00	170.99	169.19	171.08	0.001772	0.97	1.58	140.39	74.48	0.26	0.23
Tressa	Tressa	1000	Tr 20 Max Tressa	79.24	2.45	68.88	7.91	165.35	169.47	168.24	169.71	0.004857	1.66	2.31	47.63	39.89	0.41	0.49
Tressa	Tressa	1000	Tr 30 Max Tressa	87.26	4.03	73.88	9.35	165.35	169.60	168.38	169.85	0.004900	1.65	2.38	53.00	42.70	0.41	0.47
Tressa	Tressa	1000	Tr 200 Max Tres	136.08	16.19	102.68	17.20	165.35	170.14	169.24	170.46	0.005776	1.72	2.85	79.29	55.91	0.46	0.46
Tressa	Tressa	950	Tr 20 Max Tressa	79.24	0.09	79.15		163.69	168.00	166.84	168.28	0.008558	2.28	2.33	34.81	39.45	0.50	0.77
Tressa	Tressa	950	Tr 30 Max Tressa	87.26	1.32	85.94		163.69	168.15	166.99	168.43	0.008279	2.13	2.37	41.02	44.01	0.49	0.70
Tressa	Tressa	950	Tr 200 Max Tres	136.08	29.29	106.79	0.00	163.69	169.19	167.73	169.35	0.003988	1.32	2.01	102.94	72.66	0.36	0.35
Tressa	Tressa	900	Tr 20 Max Tressa	79.24	2.08	70.20	6.96	162.88	167.32	165.40	167.43	0.002355	1.14	1.58	69.54	53.67	0.28	0.32
Tressa	Tressa	900	Tr 30 Max Tressa	87.26	3.32	73.73	10.22	162.88	167.56	165.54	167.66	0.002050	1.05	1.54	83.07	60.72	0.27	0.29
Tressa	Tressa	900	Tr 200 Max Tres	136.08	19.53	84.09	32.46	162.88	168.95	166.30	169.00	0.000862	0.73	1.26	187.54	82.63	0.18	0.15
Tressa	Tressa	800	Tr 20 Max Tressa	79.24	5.26	70.71	3.27	162.35	167.00	164.64	167.11	0.001770	1.11	1.50	71.22	48.06	0.25	0.29
Tressa	Tressa	800	Tr 30 Max Tressa	87.26	8.46	74.19	4.62	162.35	167.28	164.78	167.38	0.001539	1.02	1.47	85.64	55.09	0.23	0.26
Tressa	Tressa	800	Tr 200 Max Tres	136.08	38.90	84.34	12.85	162.35	168.83	165.49	168.88	0.000682	0.70	1.21	195.55	80.48	0.16	0.14
Tressa	Tressa	750	Tr 20 Max Tressa	79.24		79.24		162.35	166.66	164.70	167.01	0.003552	2.63	2.63	30.14	21.05	0.40	0.40
Tressa	Tressa	750	Tr 30 Max Tressa	87.26		87.26		162.35	166.88	164.86	167.27	0.003629	2.75	2.75	31.73	22.65	0.41	0.41
Tressa	Tressa	750	Tr 200 Max Tres	136.08		136.08		162.35	168.14	165.72	168.71	0.003911	3.36	3.36	40.51	34.26	0.45	0.45
Tressa	Tressa	745	Tr 20 Max Tressa	79.24					166.66		167.01							
Tressa	Tressa	745	Tr 30 Max Tressa	87.26					166.88		167.27							
Tressa	Tressa	745	Tr 200 Max Tres	136.08					168.14		168.71							
Tressa	Tressa	740	Tr 20 Max Tressa	79.24		79.24		162.30	166.55	164.65	166.91	0.003719	2.67	2.67	29.73	20.24	0.41	0.41
Tressa	Tressa	740	Tr 30 Max Tressa	87.26		87.26		162.30	166.77	164.81	167.16	0.003814	2.79	2.79	31.26	21.80	0.42	0.42
Tressa	Tressa	740	Tr 200 Max Tres	136.08		136.08		162.30	167.86	165.67	168.49	0.004456	3.49	3.49	38.95	29.44	0.47	0.47
Tressa	Tressa	700	Tr 20 Max Tressa	79.24	0.18	78.96	0.10	162.25	166.60	164.74	166.73	0.002532	1.55	1.58	51.08	20.54	0.30	0.31
Tressa	Tressa	700	Tr 30 Max Tressa	87.26	0.37	86.68	0.21	162.25	166.84	164.86	166.97	0.002343	1.56	1.60	56.07	21.60	0.29	0.31
Tressa	Tressa	700	Tr 200 Max Tres	136.08	3.63	130.33	2.11	162.25	168.05	165.48	168.19	0.001774	1.49	1.73	91.37	41.07	0.27	0.32
Tressa	Tressa	650	Tr 20 Max Tressa	79.24		79.24		162.20	166.20	164.55	166.61	0.004542	2.83	2.83	28.00	15.62	0.45	0.45
Tressa	Tressa	650	Tr 30 Max Tressa	87.26		87.26		162.20	166.38	164.70	166.84	0.004737	2.98	2.98	29.29	15.94	0.46	0.46
Tressa	Tressa	650	Tr 200 Max Tres	136.08		136.08		162.20	167.21	165.58	167.97	0.006337	3.88	3.88	35.05	18.64	0.55	0.55
Tressa	Tressa	645	Tr 20 Max Tressa	79.24					166.20		166.61							
Tressa	Tressa	645	Tr 30 Max Tressa	87.26					166.38		166.84							
Tressa	Tressa	645	Tr 200 Max Tres	136.08					167.21		167.97							
Tressa	Tressa	640	Tr 20 Max Tressa	79.24		79.24		162.18	166.04	164.53	166.48	0.005116	2.93	2.93	27.02	15.35	0.48	0.48
Tressa	Tressa	640	Tr 30 Max Tressa	87.26		87.26		162.18	166.21	164.68	166.69	0.005391	3.10	3.10	28.18	15.64	0.49	0.49
Tressa	Tressa	640	Tr 200 Max Tres	136.08		136.08		162.18	166.79	165.56	167.70	0.008323	4.21	4.21	32.29	17.15	0.63	0.63

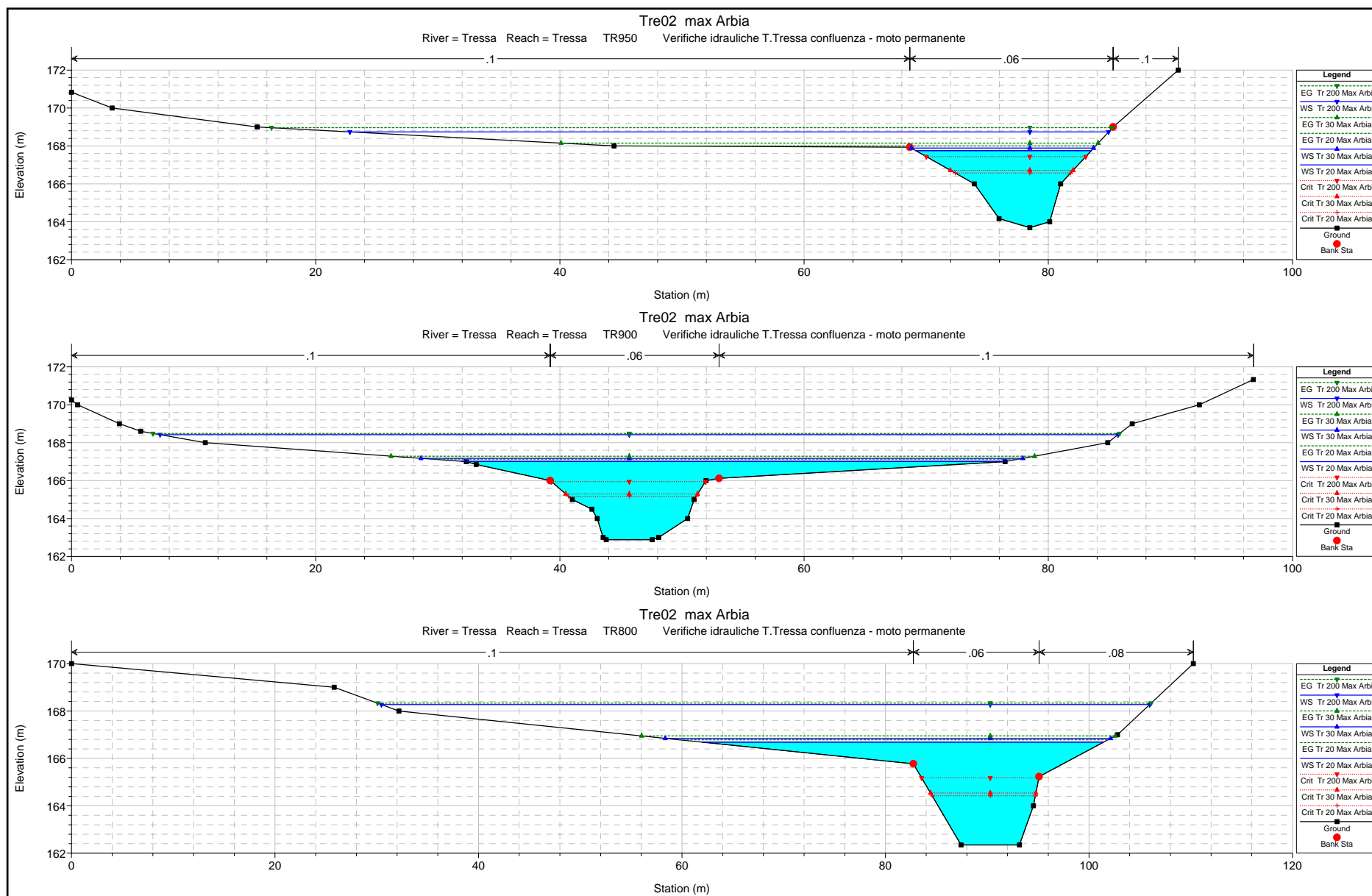
HEC-RAS Plan: TRE02_MT (Continued)

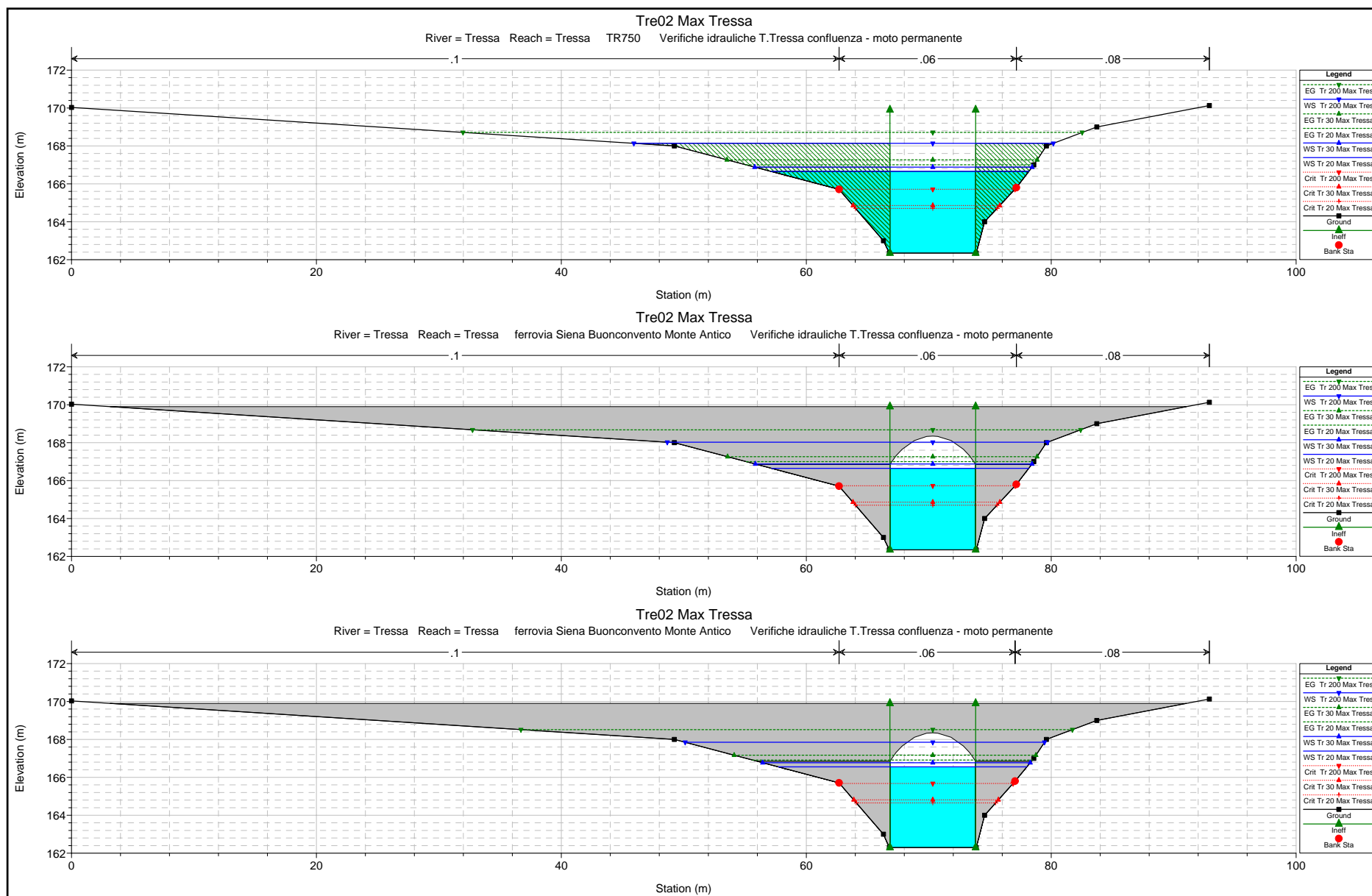
River	Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Total (m/s)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
Tressa	Tressa	600	Tr 20 Max Tressa	79.24	0.93	78.15	0.16	162.09	166.09	164.55	166.29	0.003795	1.85	1.96	42.83	19.74	0.36	0.40
Tressa	Tressa	600	Tr 30 Max Tressa	87.26	1.45	85.58	0.24	162.09	166.28	164.67	166.48	0.003725	1.87	2.03	46.65	21.63	0.36	0.41
Tressa	Tressa	600	Tr 200 Max Tres	136.08	6.47	128.77	0.84	162.09	167.00	165.31	167.30	0.004233	2.08	2.48	65.48	30.87	0.40	0.46
Tressa	Tressa	500	Tr 20 Max Tressa	79.24	1.89	77.05	0.31	161.81	165.86	164.36	166.05	0.004050	1.74	1.95	45.66	27.93	0.37	0.43
Tressa	Tressa	500	Tr 30 Max Tressa	87.26	3.18	83.56	0.52	161.81	166.06	164.50	166.26	0.003801	1.69	1.97	51.58	31.18	0.36	0.42
Tressa	Tressa	500	Tr 200 Max Tres	136.08	13.12	121.08	1.88	161.81	166.80	165.17	167.05	0.003871	1.71	2.30	79.38	45.23	0.38	0.41
Arbia	Arbia 1	800	Tr 20 Max Tressa	309.26		307.00	2.26	159.46	164.74	163.41	165.07	0.002893	2.36	2.54	130.94	249.66	0.49	0.60
Arbia	Arbia 1	800	Tr 30 Max Tressa	352.54		345.52	7.02	159.46	165.03	163.63	165.36	0.002700	2.23	2.59	157.89	356.86	0.48	0.58
Arbia	Arbia 1	800	Tr 200 Max Tres	586.02	0.09	395.16	190.77	159.46	166.25	164.68	166.40	0.001175	0.85	2.09	690.83	644.59	0.33	0.23
Arbia	Arbia 1	790	Tr 20 Max Tressa	309.26	6.78	301.51	0.97	159.31	164.47	162.51	164.71	0.001615	1.89	2.20	163.28	87.32	0.38	0.44
Arbia	Arbia 1	790	Tr 30 Max Tressa	352.54	11.53	339.25	1.76	159.31	164.77	162.72	165.02	0.001546	1.82	2.28	193.72	170.20	0.38	0.54
Arbia	Arbia 1	790	Tr 200 Max Tres	586.02	28.07	458.90	99.05	159.31	165.94	163.86	166.16	0.001131	1.10	2.34	534.97	329.59	0.34	0.27
Arbia	Arbia 2	750	Tr 20 Max Tressa	388.50	4.74	383.52	0.24	159.30	164.20	162.89	164.67	0.003439	2.76	3.04	140.94	78.45	0.55	0.66
Arbia	Arbia 2	750	Tr 30 Max Tressa	439.80	10.17	428.06	1.58	159.30	164.50	163.12	164.98	0.003146	2.65	3.09	166.27	88.41	0.53	0.62
Arbia	Arbia 2	750	Tr 200 Max Tres	722.10	39.29	587.70	95.12	159.30	165.71	164.43	166.12	0.002172	1.56	3.14	462.17	312.68	0.47	0.41
Arbia	Arbia 2	600	Tr 20 Max Tressa	388.50		388.50		158.29	163.42	162.57	164.10	0.010005	3.65	3.65	106.42	34.63	0.66	0.66
Arbia	Arbia 2	600	Tr 30 Max Tressa	439.80	0.01	439.79		158.29	163.71	162.81	164.44	0.010004	3.76	3.76	116.97	37.47	0.66	0.68
Arbia	Arbia 2	600	Tr 200 Max Tres	722.10	19.52	678.94	23.64	158.29	164.73	163.95	165.67	0.010003	3.09	4.42	234.03	292.62	0.69	1.10

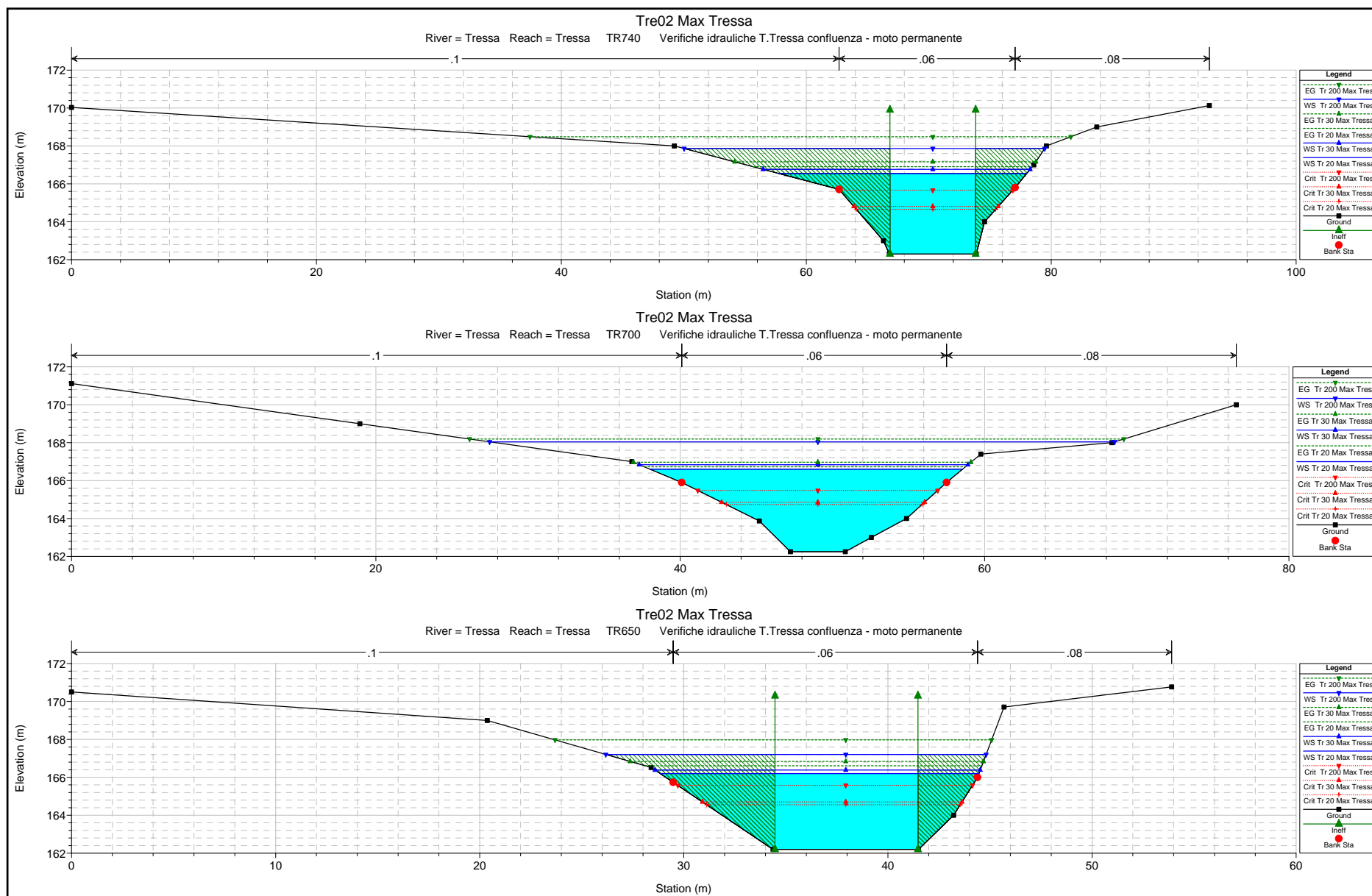


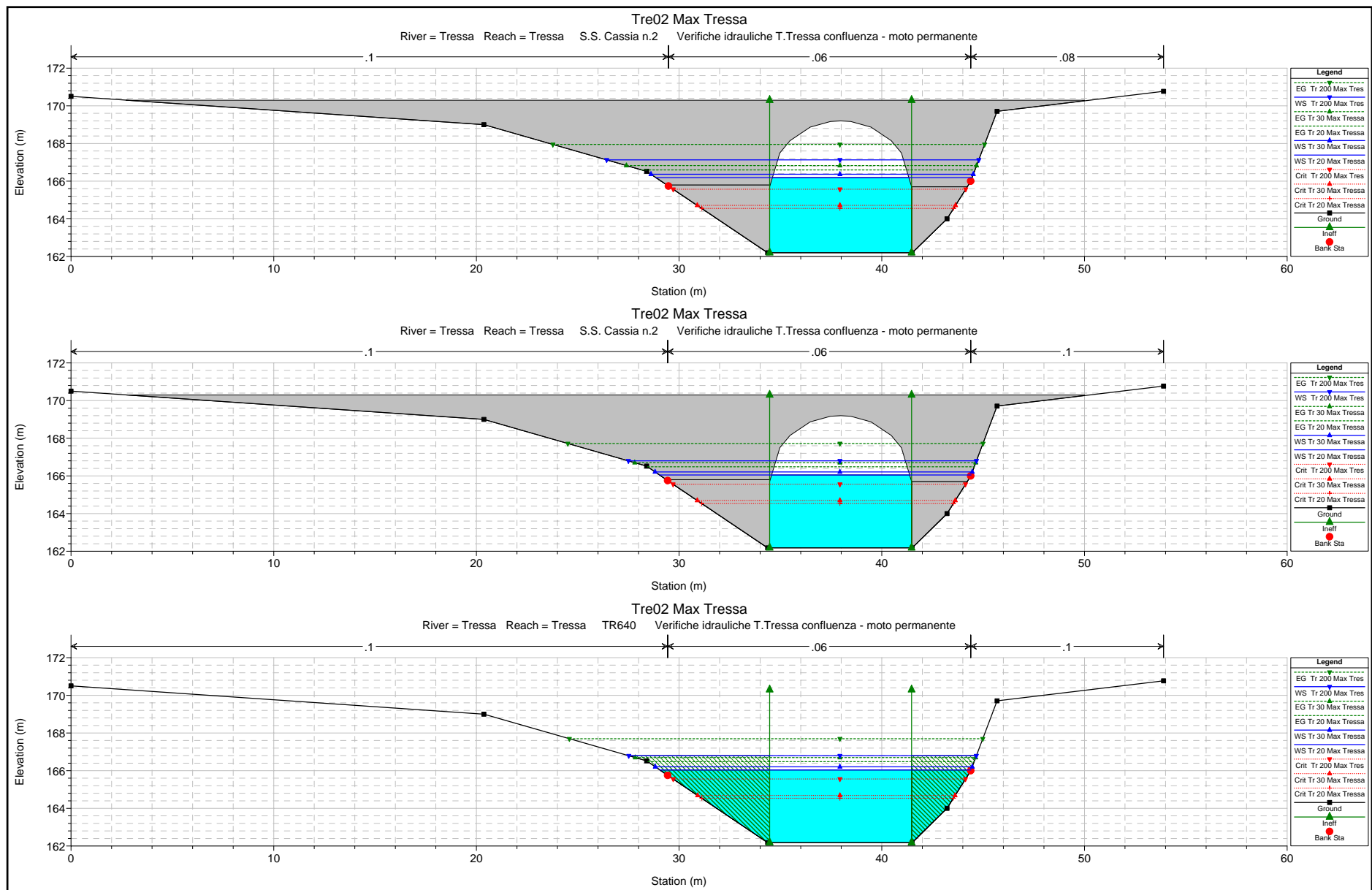


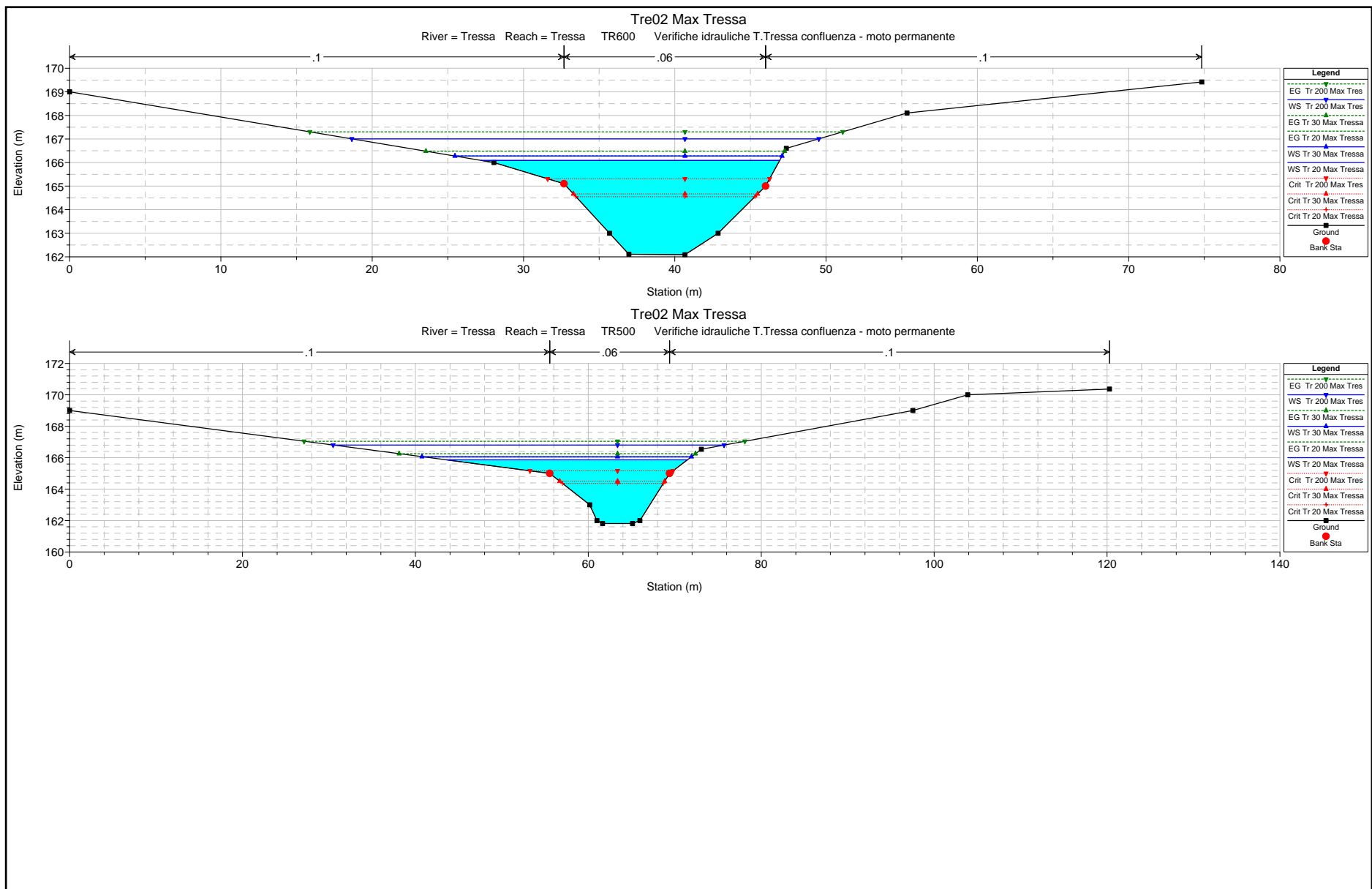


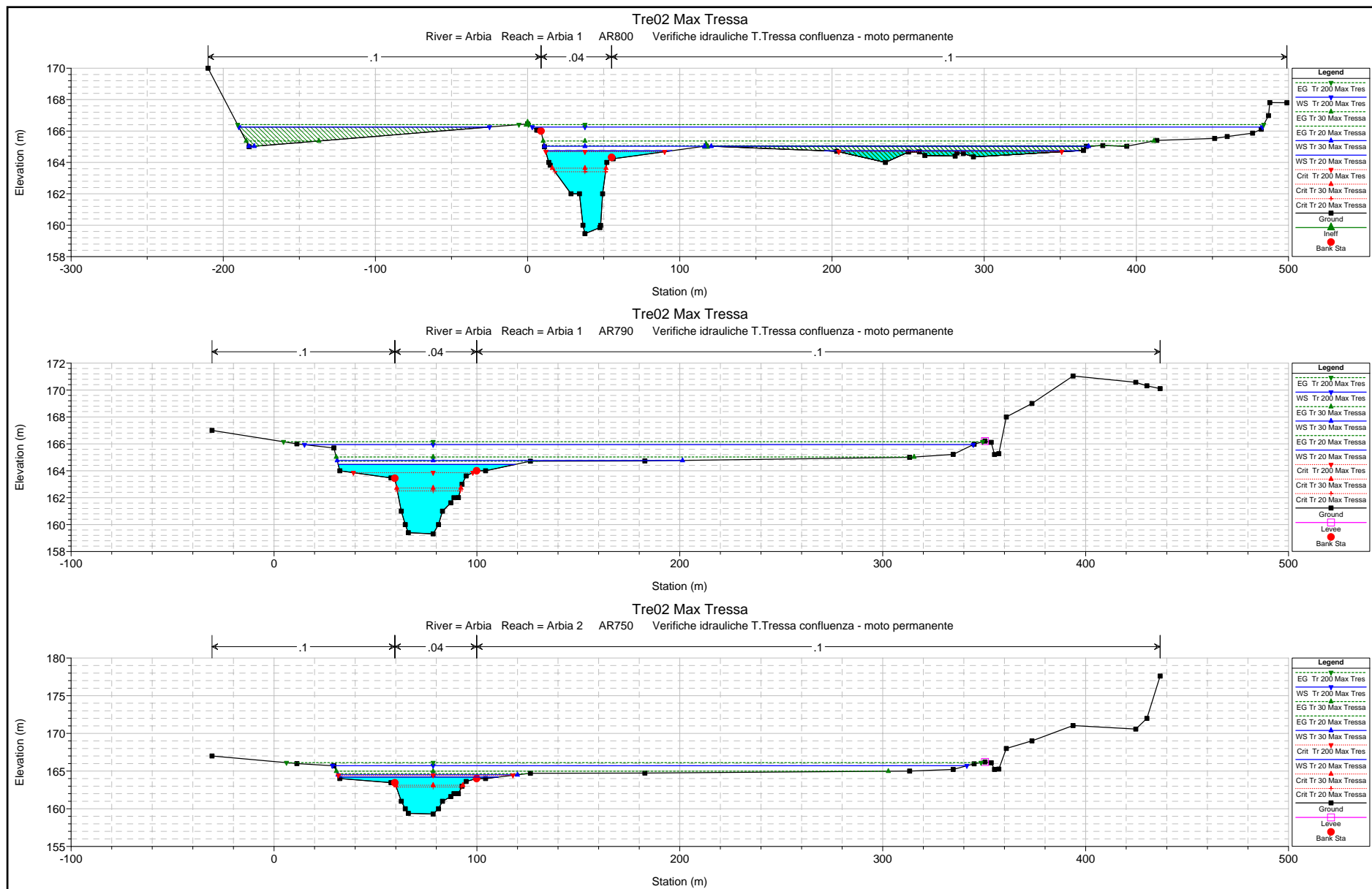


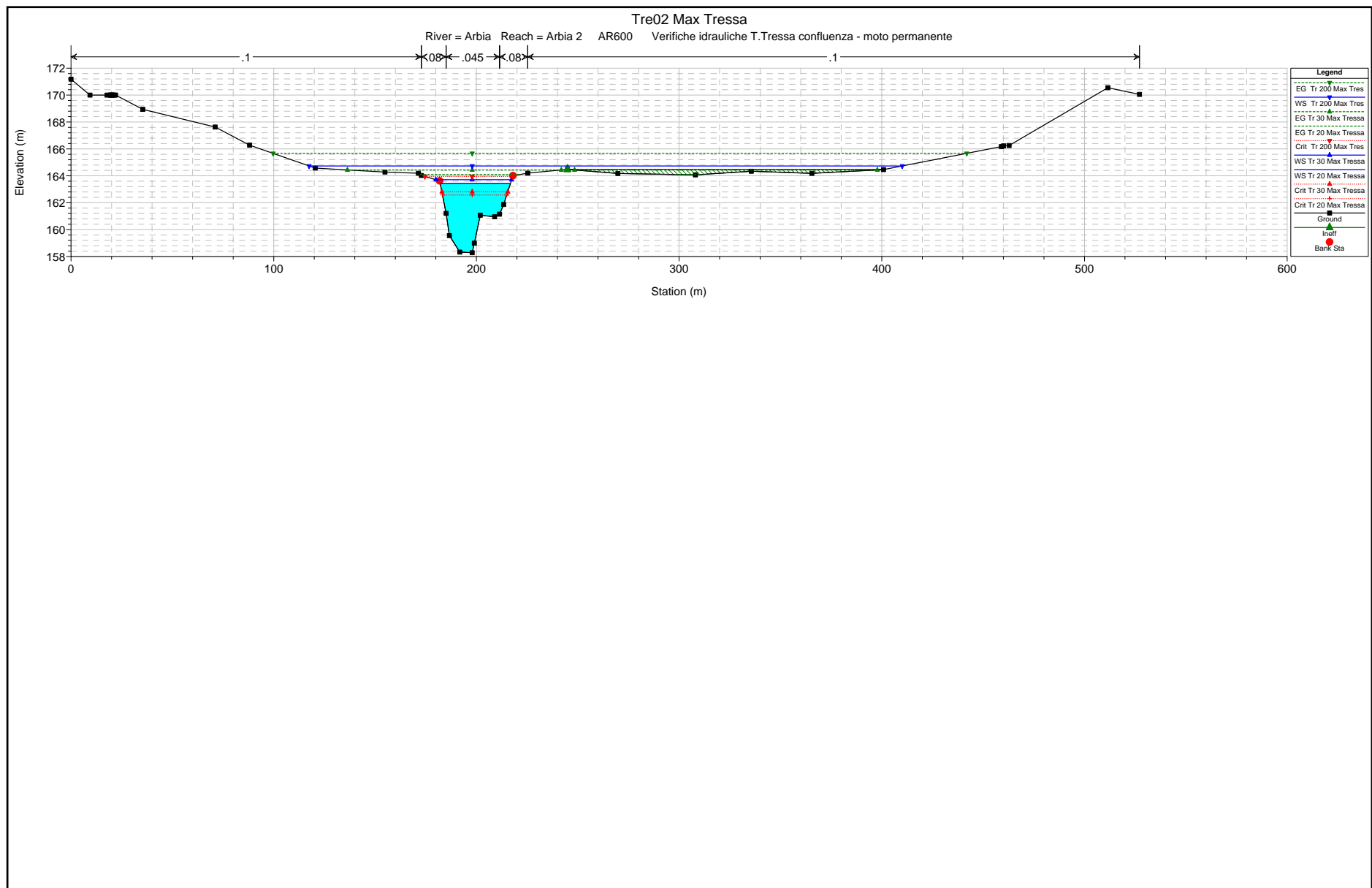








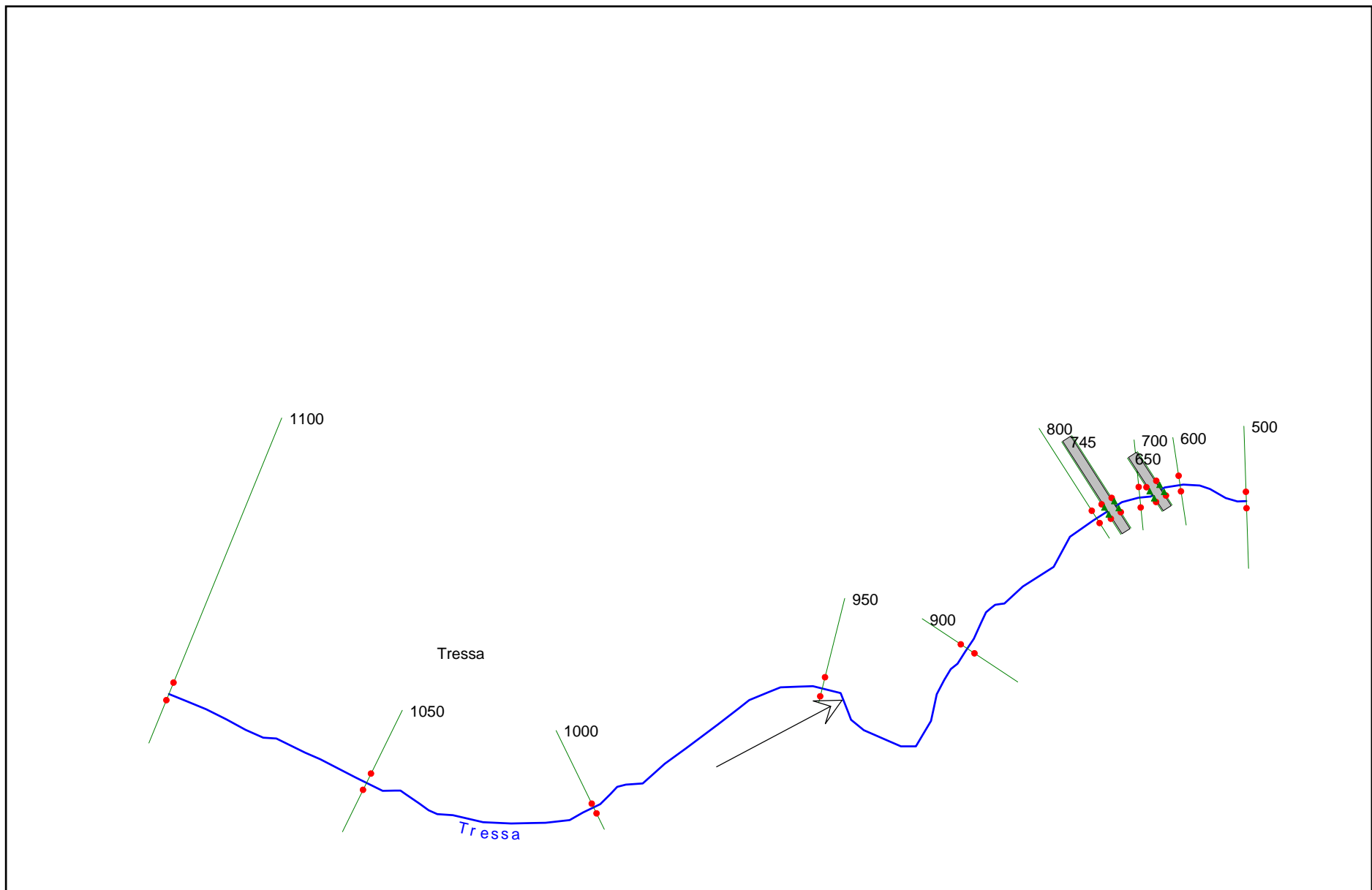




ALLEGATI DI CALCOLO HEC-RAS 3.1.3

TRATTO TRE02 – TORRENTE TRESSA

EVENTO CON PORTATA MASSIMA T. ARBIA ($D_{cr} = 6.70$)



HEC-RAS Plan: TRE02 MA River: Tressa Reach: Tressa

Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Total (m/s)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
Tressa	1100	Tr 20 Max Arbia	66.43	3.39	63.04	0.01	166.71	170.39	168.75	170.52	0.003669	1.32	1.63	50.31	51.20	0.34	0.43
Tressa	1100	Tr 30 Max Arbia	73.07	5.54	67.51	0.02	166.71	170.51	168.87	170.64	0.003566	1.29	1.66	56.70	52.66	0.33	0.40
Tressa	1100	Tr 200 Max Arbi	114.80	18.88	95.81	0.11	166.71	171.13	169.52	171.28	0.003476	1.24	1.90	92.68	80.30	0.34	0.37
Tressa	1050	Tr 20 Max Arbia	66.43	5.86	57.77	2.80	166.00	169.96	168.03	170.03	0.001871	0.93	1.32	71.12	59.03	0.25	0.27
Tressa	1050	Tr 30 Max Arbia	73.07	7.82	61.50	3.76	166.00	170.09	168.14	170.17	0.001808	0.92	1.34	79.48	61.30	0.25	0.26
Tressa	1050	Tr 200 Max Arbi	114.80	20.73	83.81	10.26	166.00	170.73	168.74	170.82	0.001755	0.94	1.50	121.72	70.70	0.25	0.23
Tressa	1000	Tr 20 Max Arbia	66.43	0.54	60.50	5.39	165.35	169.20	168.00	169.43	0.005002	1.76	2.21	37.71	32.22	0.41	0.52
Tressa	1000	Tr 30 Max Arbia	73.07	1.33	65.01	6.72	165.35	169.35	168.13	169.59	0.004913	1.70	2.26	42.94	37.25	0.41	0.51
Tressa	1000	Tr 200 Max Arbi	114.80	10.37	90.46	13.97	165.35	169.93	168.81	170.22	0.005387	1.68	2.66	68.24	49.83	0.44	0.46
Tressa	950	Tr 20 Max Arbia	66.43		66.43		163.69	167.75	166.57	168.00	0.008234	2.19	2.19	30.27	14.38	0.48	0.48
Tressa	950	Tr 30 Max Arbia	73.07		73.07		163.69	167.89	166.72	168.15	0.008464	2.27	2.27	32.24	14.94	0.49	0.49
Tressa	950	Tr 200 Max Arbi	114.80	14.10	100.70		163.69	168.74	167.44	168.96	0.005674	1.59	2.21	72.41	62.14	0.42	0.47
Tressa	900	Tr 20 Max Arbia	66.43	1.17	62.04	3.21	162.88	167.02	165.18	167.13	0.002555	1.21	1.54	54.70	44.68	0.29	0.35
Tressa	900	Tr 30 Max Arbia	73.07	1.53	66.51	5.02	162.88	167.17	165.30	167.29	0.002470	1.18	1.57	61.99	49.30	0.29	0.34
Tressa	900	Tr 200 Max Arbi	114.80	11.78	79.61	23.41	162.88	168.42	165.94	168.49	0.001135	0.79	1.33	144.95	78.47	0.21	0.19
Tressa	800	Tr 20 Max Arbia	66.43	2.41	62.06	1.96	162.35	166.69	164.42	166.78	0.001823	1.16	1.44	57.30	39.47	0.25	0.31
Tressa	800	Tr 30 Max Arbia	73.07	3.70	66.79	2.58	162.35	166.85	164.54	166.95	0.001819	1.14	1.48	63.95	43.79	0.25	0.30
Tressa	800	Tr 200 Max Arbi	114.80	25.24	79.98	9.58	162.35	168.27	165.18	168.33	0.000870	0.76	1.27	151.71	75.51	0.18	0.17
Tressa	750	Tr 20 Max Arbia	66.43		66.43		162.35	166.43	164.44	166.71	0.002979	2.32	2.32	28.58	19.48	0.37	0.37
Tressa	750	Tr 30 Max Arbia	73.07		73.07		162.35	166.54	164.58	166.86	0.003296	2.49	2.49	29.36	20.26	0.39	0.39
Tressa	750	Tr 200 Max Arbi	114.80		114.80		162.35	167.71	165.36	168.19	0.003582	3.06	3.06	37.55	28.41	0.42	0.42
Tressa	745	Tr 20 Max Arbia	66.43					166.43		166.71							
Tressa	745	Tr 30 Max Arbia	73.07					166.54		166.86							
Tressa	745	Tr 200 Max Arbi	114.80					167.71		168.19							
Tressa	740	Tr 20 Max Arbia	66.43		66.43		162.30	166.35	164.39	166.63	0.003060	2.34	2.34	28.35	18.84	0.37	0.37
Tressa	740	Tr 30 Max Arbia	73.07		73.07		162.30	166.45	164.53	166.77	0.003421	2.52	2.52	29.04	19.53	0.39	0.39
Tressa	740	Tr 200 Max Arbi	114.80		114.80		162.30	167.54	165.31	168.04	0.003866	3.13	3.13	36.70	27.23	0.44	0.44
Tressa	700	Tr 20 Max Arbia	66.43	0.06	66.33	0.04	162.25	166.38	164.52	166.49	0.002326	1.42	1.44	46.70	19.56	0.28	0.29
Tressa	700	Tr 30 Max Arbia	73.07	0.11	72.90	0.06	162.25	166.49	164.64	166.61	0.002459	1.50	1.52	48.84	20.05	0.29	0.31
Tressa	700	Tr 200 Max Arbi	114.80	1.88	112.07	0.85	162.25	167.67	165.22	167.81	0.001771	1.48	1.63	77.53	32.87	0.26	0.31
Tressa	650	Tr 20 Max Arbia	66.43		66.43		162.20	166.10	164.29	166.40	0.003484	2.44	2.44	27.27	15.44	0.39	0.39
Tressa	650	Tr 30 Max Arbia	73.07		73.07		162.20	166.15	164.43	166.50	0.004039	2.65	2.65	27.62	15.52	0.43	0.43
Tressa	650	Tr 200 Max Arbi	114.80		114.80		162.20	167.06	165.21	167.64	0.004967	3.37	3.37	34.05	18.12	0.49	0.49
Tressa	645	Tr 20 Max Arbia	66.43					166.10		166.40							
Tressa	645	Tr 30 Max Arbia	73.07					166.15		166.50							
Tressa	645	Tr 200 Max Arbi	114.80					167.06		167.64							
Tressa	640	Tr 20 Max Arbia	66.43		66.43		162.18	165.99	164.27	166.30	0.003760	2.49	2.49	26.66	15.26	0.41	0.41
Tressa	640	Tr 30 Max Arbia	73.07		73.07		162.18	166.01	164.41	166.39	0.004453	2.72	2.72	26.83	15.31	0.44	0.44
Tressa	640	Tr 200 Max Arbi	114.80		114.80		162.18	166.82	165.19	167.45	0.005830	3.54	3.54	32.45	17.23	0.52	0.52

HEC-RAS Plan: TRE02 MA River: Tressa Reach: Tressa (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Total (m/s)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Froude # XS
Tressa	600	Tr 20 Max Arbia	66.43	0.69	65.63	0.12	162.09	166.02	164.33	166.17	0.002895	1.60	1.69	41.48	19.03	0.32	0.35
Tressa	600	Tr 30 Max Arbia	73.07	0.80	72.13	0.14	162.09	166.06	164.45	166.22	0.003368	1.73	1.84	42.12	19.37	0.34	0.38
Tressa	600	Tr 200 Max Arbi	114.80	5.18	108.96	0.66	162.09	166.96	165.06	167.18	0.003155	1.79	2.12	64.06	30.18	0.35	0.39
Tressa	500	Tr 20 Max Arbia	66.43	1.56	64.61	0.25	161.81	165.86	164.14	165.99	0.002864	1.46	1.64	45.53	27.85	0.31	0.36
Tressa	500	Tr 30 Max Arbia	73.07	1.72	71.07	0.28	161.81	165.86	164.26	166.02	0.003465	1.60	1.80	45.53	27.85	0.34	0.40
Tressa	500	Tr 200 Max Arbi	114.80	11.22	101.97	1.61	161.81	166.82	164.90	166.99	0.002709	1.43	1.93	80.07	45.59	0.32	0.35

